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Mining Electrical Engineers

Certificates of competence

MINING is essentially a man's job. It offers a splendid career to the keen man who is not seeking security first. As Dr. C. B. Kingston pointed out in his presidential address to the Institution of Mining and Metallurgy last month, the ambitious man who likes a spice of adventure will find satisfaction in a constructive occupation that makes a definite contribution to the world's welfare.

Such a man needs to be a good deal more than a mere technician, for the technique of mining has become so all-embracing as almost to defy definition. His training must consequently be of a liberality consonant with the requirements, and credit is due to the far-seeing who, it has aptly been said, "perceived the dawn" of the necessity for some form of certification of competency for the mining electrical engineer. They instituted, years before the subject became of prime interest, the Association of Mining Electrical Engineers' examination scheme and lately the matter has assumed such critical proportions as will surely command the serious attention it warrants.

Justification for the importance attached to the subject by the Association is to be found in the rapid progress being made, ample illustration of which was provided in Mr. H. A. McGuffie's presidential address at the Glasgow Convention last week. The rate of growth is still accelerating, and each year sees more motors installed than in the one before. In this connection a statement made by the retiring president, Mr. J. A. B. Horsley, as Electrical Inspector of Mines, cannot be over-emphasised. It was to the effect that the great increase in the use of electricity in mines had not been accompanied by an increase in the number of accidents. As an example of the growth of load, the number of electrically driven coal cutters employed is about two and a half times that of twenty years ago.

In their article in this issue, Professor David Jones and Mr. C. S. Chubb express the view that so long as the apparatus now available is properly maintained no danger will arise from its use. This throws the onus on to the men operating the plant, and while the stationary nature of the accident rate may be a cause of legitimate self-congratulation to both manufacturer and operator it provides no reason for complacency, so long as accidents occur that could have been avoided.

Quoting from the last annual report of the Electrical Inspector, which records six purely electrical accidents which involved the loss of nine lives: "All of these accidents could have been avoided by greater care on the part of the individual or by more effective supervision."

This indicates the necessity for certification, which was one of the several questions, complex and controversial, upon which the A.M.E.E. Convention had to exercise critical judgment, for the decisions now being come to are likely to be momentous in their influence on the future effectiveness of the Association's work.

First, it seems inevitable in the event of certification of colliery engineers becoming compulsory in the near future that some form of "service certificate" will have to be provided to enable the industry to carry on until some regular organised scheme is evolved. Secondly, and more important, it must be realised that if certification were to be related merely to the ensuring of safety in mines, which is all that relevant Government Departments are concerned with, mine managers would require some further assurance of the man's electro-mechanical fitness to take control and maintain plant as profit-earning equipment.

A safe engineer is obviously a good technician, but the reverse is not necessarily true. Written answers to well-chosen questions can be indicative of technical ability without furnishing any guarantee of the safety competence of the candidate. It appears, therefore, that the latter essential qualification will have to be demonstrated in some other way and possibly assessed by some other body. The example of the medical profession merits study, and considerable value is attached to oral tests supplemented by records of service.

In any case, holders of the A.M.E.E. examination certificate will be prepared in advance for the advent of an official scheme of certification whenever it comes.

The E.C.A. Conference

NEXT week (June 22nd to 24th) the Electrical Contractors' Association and its allied bodies are holding their twelfth annual conference. Hastings has been chosen this year, and we are informed that the number of delegates is well above last year's total. The programme is on similar lines to those which have proved so successful at previous gatherings and, given good weather, the Conference should be up to its usual happy standard. Generally two or, at the most, three papers have been considered sufficient mental pabulum, but this year there are to be five—all concentrated into next Thursday. The subjects are of a widely varying character and should prove interesting and instructive. The papers are as follows:—"What Insurance is Desirable for Electrical Contractors, and its Cost?" by Mr. E. A. Reynolds; "How to Avoid Fittings and Apparatus being Excluded from the Contractor's Contract," by Mr. W. Cross; "The Application of the Electric Discharge Lamp to Interior Lighting" (with demonstrations), by Mr. W. J. Jones; "Holidays with Pay in the Electrical Industry—Two Years' Experience," by Mr. A. G. Bruty; and "The Technique and Morality of Advertising," by Mr. W. I. Jones. Any strain due to so much business in one day will be amply countered by the social functions which have been arranged—the reception by the President (Mr. H. E. Walker), a civic reception, a garden party and a final ball and cabaret.

Reorganisation Proposals

IN a letter published in this issue Mr. A. J. C. De Renzi expresses righteous indignation at a communication from Mr. H. M. Sayers to which we referred last week. Mr. Sayers called for constructive proposals from the electrical industry for supply reorganisation, saying that he was disappointed that the I.M.E.A. and Mr. De Renzi's Committee had failed to produce such proposals. In reply to this Mr. De Renzi recalls the scheme presented by his Committee to the competent authorities and to a group of Members of Parliament. The scheme proposes the establishment of co-ordinating boards for particular areas to secure uniformity in bulk supply charges and to stimulate rural development (by means of a levy on the whole industry if necessary); and to require all undertakings to establish showrooms, service facilities, standard tariffs, wiring schemes, etc., and to cable all streets in built-up areas. It is proposed that the scheme shall be given a period of five years in which to prove its worth, and the Committee maintains that it would accelerate electrical development to a far greater degree than the "White Paper" proposals. Such a plan might improve matters, but perhaps the authorities (whose views are apparently not yet available) may consider it merely deferring the evil day of a more drastic reorganisation.

Heater Positions

A COMMON impression that heating requirements are less when radiators are placed under windows is not supported by experiments carried out by the Building Research Board. According to the Report of that body for 1937 (Stationery Office, 3s. 6d.), it makes little difference in that respect where the radiators are situated. Position does, however, make a marked difference with regard to uniformity of heating, and, in the experiments referred to, the floor draught with the radiators against an inner wall reached 33 ft. per min. measured 3 in. above the floor instead of 8 ft. per min. with the radiators in the more conventional spot. This indicates that there is much to be said for the usual practice. Another group of tests, undertaken to ascertain the relative efficiencies of radiator, ceiling and floor heating, and also the heat emission of extended surface heating panels with various mean surface temperatures, gave positive results. Taking radiators under windows as the standard for comparison, the saving with floor heating in an unventilated room was 11 per cent. and in a ventilated room 6 per cent. With ceiling heating there was no saving in the first case and 2 per cent. in the second. These are, of course, only items—important as they are—that have to be taken into account in working out the total costs of any installation, each of which has to be treated on its merits.

Big Schemes

RECENT reports from overseas tell of large electrical construction schemes under way in all parts of the world. In Austria the revived Oglerboden hydro-electric project is planned to give 10,000 million kWh a year; the Kuibyshev scheme in Russia will provide an additional 2,500,000 kW; in America the joint U.S.A.-Canadian development of the Great Lakes is again under consideration; a proposed hydro-electric project in Ceylon is estimated to cost £1,800,000; and in Australia the New South Wales Government has before it a favourable report on a £12,000,000 electrical development scheme. From South Africa comes news of important construction works to be undertaken by the Johannesburg Corporation over a period of four years. The total expenditure involved is £7,397,000, of which £2,005,000 is for a new power station at Orlando, and at least £1,000,000 will be required for distribution extensions.

Back to Normal

IT is pleasing to learn from the Electricity Commissioners' monthly figures of electricity output that the rate of expansion, which slackened off in March and April, resumed its normal course in May, when the improvement over the corresponding month of last year exceeded 14 per cent. May, 1937, of course, contained two Bank Holidays—Whitsun and the Coronation—which must have affected the industrial consumption, but to some extent this would have been offset by the country-wide illuminations, and the rate of increase of 11.3 per cent. was not greatly below the average for the year. It is interesting to notice that the usual seasonal decline in output did not take place last month. It was the same in 1933 when, as now, there was a temporary drop in the rate of progress in the early months of the year.

Public Relations

IN the discussions regarding the proposed amalgamation of electricity supply undertakings stress has been laid upon the necessity of maintaining the intimate contact with consumers which is possible in small concerns. The need for something of this sort is also appreciated in the United States. The Pennsylvania Edison Co. has a "district representative plan," by means of which each 2,000 or so consumers are placed in charge of a man specially picked for his ability to foster "public relations." Extraordinary success is reported; for instance, "delinquent accounts" have been reduced to a quarter of the previous total, disconnections for non-payment have almost disappeared, and sales of both energy and appliances have shown remarkable expansion. So popular have the district representatives become that they are treated as members of the family. The company's president proudly states in an article in an American contemporary that one of them was actually invited to a funeral service of a member of a consumer's family.

The Vehicle Association

IN dealing with the subject of electric vehicles in our last issue we forgetfully referred to the body responsible for propaganda and development activities by its old title—the Electric Vehicle Committee of Great Britain. Early this year there was a reorganisation and the Committee became the Electric Vehicle *Association* and gained considerably in strength and finance. Major A. L. Trundle is chairman of the Executive Committee, Mr. A. C. Cramb the secretary, and Mr. J. Steele assistant secretary.

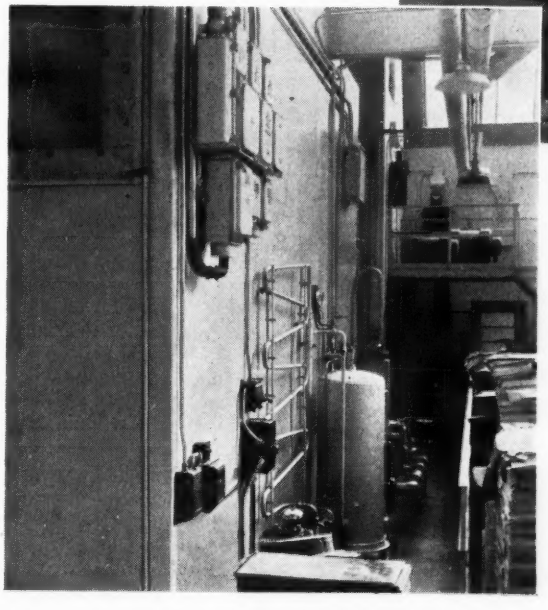
Electricity in Printing

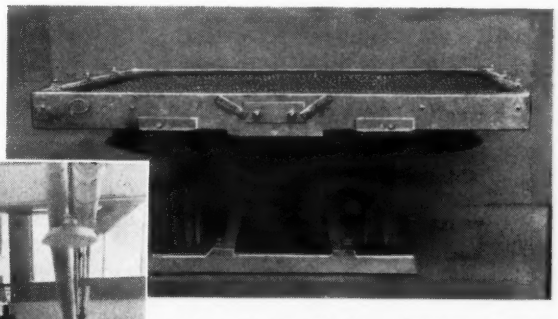
Applications in a new works at Eastleigh

Considerable economies have been effected by the use of individual electric drives, while the adoption of air conditioning has resulted in a marked simplification and improvement of manufacturing methods

AN opportunity to see something of the applications of electricity to high-class lithographic and letterpress printing was recently afforded us at the new works of Sir Joseph Causton & Son, Ltd., at Eastleigh. Entering the main doors and passing through the offices, one steps on to a raised platform which gives a complete bird's-eye view of the works. Overhead there are the trunk lines of the air-conditioning plant and the paper-conditioning conveyors.

Because of the obvious difficulties introduced in colour registration as a result of the change of actual size of the paper with change of humidity, a complete air-conditioning plant designed especially for paper manufacture has been installed. Two Adamson boilers are an essential part of this equipment, by means of which the minimum temperature is safeguarded and constant relative humidity is maintained. Air is drawn in from outside the building to an air-mixing chamber through which some of the air from the building is re-circulated. It is then subjected to very fine sprays of water in a separate chamber and is thereby given the required humidity and also washed before being passed on to the cooling and heating chamber.





Left: Air-conditioning chamber showing fan motors and circulating pumps. Above: A graining machine *[Elec. Rev. photos.*

Steam coils supplied directly from the boilers provide the necessary heat in this chamber, while water coils are the medium for cooling, the evaporative method being employed instead of refrigeration. The heated or cooled air is then blown through the specially designed trunking system throughout the building, first *via* underground ducts and central uprights and finally through distribution trunking arms radiating from the tops of the uprights.

The oil-fired furnaces are automatically controlled so that when the necessary pressure is reached the firing is changed over to a low flame. Considerable economy has been effected in the fan drive for the air circulation by the adoption of separate motor drives to provide more precisely the different fan speeds dictated by seasonal temperature conditions. A 40-h.p. motor has a speed of 1,455 r.p.m. and a 20-h.p. motor runs at 900 r.p.m. By changing from the large to the small motor an air speed reduction is obtainable in direct ratio to the speed of the drive. With the higher speed of the fan the total air content of the building is changed approximately six times per hour.

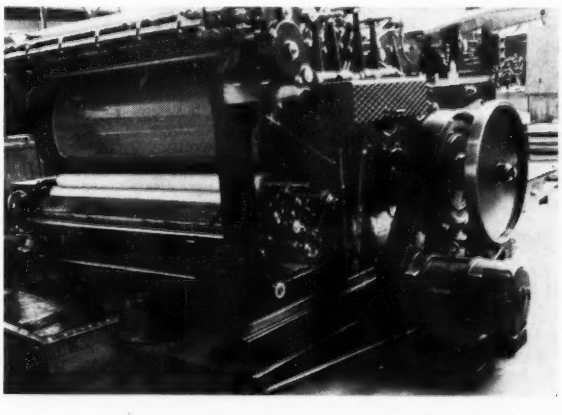
Paper conditioning takes place actually in the normal factory atmosphere. Before printing, the paper is hung and circulated in an overhead conveyor, loading and unloading being effected while the conveyor is in motion. This conveyor is driven by a 1-h.p. squirrel-cage motor.

Descending from the platform on to the factory floor one enters the lithographic department, where there are the photo lithographers, artists, plate preparers, transferers, proofers, copper plate engravers and machine sections. The plate-preparing department comprises a number of machines for cleaning or scouring off old work, known as scrubbing-out machines. These are driven by four sections of belt so as to give an overall universal drive by a ½-h.p. squirrel-cage motor. After all the grease is removed from the plate in this way, the plate is then washed off in preparation for graining.

On the graining table the plate is covered with marbles of varying size according to the degree of fineness of the grain required. By a shaking operation of the table a semi-rotary motion is applied to the marbles, which, by the medium of grit, introduces the required grain. Each graining machine has a single 1-h.p. squirrel-cage motor drive. The prepared plate is then ready for the artist or transferer.

Passing on to the machine department one is impressed by the layout and rows of the latest designs of offset and poster printing machines. The machines print direct from the plate on the poster cylinder to the paper and are driven by 5-h.p. motors, with rotor regulation. The offset machines, both single- and double-colour, print from the plate to a rubber blanket and then from the rubber blanket to the paper. The two-colour machines are driven by 12-h.p. motors with rotor regulation. Attached to each machine is the latest stream-line feeder, which automatically feeds the plain paper into the machines. A small 2-h.p. driven air compressor provides the necessary suction for the feeder.

At the extreme end of the building one enters the composing department, where there are the Ludlow installation, monotype machines, the compositors and readers. Copy entering the composing department goes first to the monotype operator who, on a keyboard similar to that of a typewriter, taps the words and produces perforations on a paper ribbon, each letter giving its own peculiar formation. This paper ribbon or spool is then handed to the monotype caster attendant who places this on the casting machine, which automatically casts the different characters or letters in accordance with the letter equivalents of perforations made by the keyboard operator. The casting machines are driven by a ½-h.p. squirrel-cage motor with a cone pulley drive to provide a variable speed on the machine. The motor speed is 900 r.p.m. Where direct speed variation is required all the motors in both sections are squirrel-cage with rotor regulation. Air is supplied to both the casters and the keyboard at 25 lb. per sq. in. by a 5-h.p. motor-driven compressor.



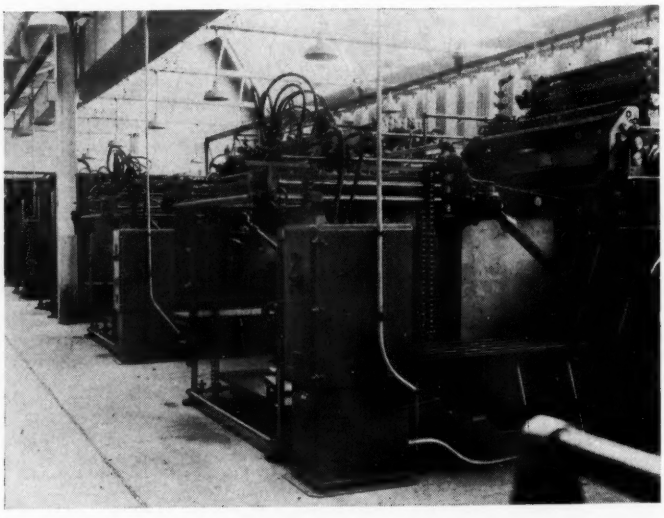
[Elec. Rev. photo.

A poster printing machine showing drive

The foundry where electrotyping and stereotyping is done was the next department we visited. For the stereotype the forme is moulded by means of a hot press. The mould is made from papier mâché which is beaten into the type by a brush. When the required depth

is obtained the whole is placed under the hot press for, say, twenty minutes with handwheel pressure. It is then dried sufficiently for casting. The mould is next placed in a casting box and molten stereo metal is poured in. When set the cast is turned out and with the required finishing is ready for machine.

For electrotype the forme is first coated with plaster of



A row of offset printing machines [*Elec. Rev. photo.*

Paris and then moulded in wax or lead by a hydraulic press driven by a 3-h.p. motor, imparting an overall pressure of 500 tons. To render its surface conducting the mould is blackleaded, and after stripping out the edges it is placed in the vats for copper or nickel deposition. Current is applied to the copper vats by a 1,000-A, 8-V generator coupled to a 12-h.p. squirrel-cage motor. Shunt regulation provides for the varying voltages at the vats. Nickel facing vats are supplied by a 3-h.p. motor-generator set. In the letterpress printing department a modern plant consisting of a considerable number of two-revolution presses and vertical machines. The presses are driven by 8-h.p. motors with a maximum speed of 1,400 r.p.m. and a 25 per cent. speed regulation by rotor equipment. The vertical machines are driven by 3-h.p. squirrel-cage motors, the speed regulation being governed by movable pulleys from the machines. From this department one enters the bookbinding, machine ruling, die stamping, varnishing, warehouse and boxmaking sections.

In the warehouse section there is an up-to-date installation of folding machines, thread and wire stitching machines, fully automatic cutting machines and punching-out machines. Varnished paper is treated in electrically-heated drying machines, each of which has a heating load of 12 kW.

The electricity supply is received at 6,000 V and transformed to 400 V 3-phase a.c., on site by a 500-kW transformer. *Via* a 1,000-A main switch and six feeder switches it is then distributed throughout the works, each feeder supplying a six-way and neutral bar 100-A fuseboard. The total horse-power of motors installed throughout the works is 692, in units from fractional h.p. to 40 h.p.

The lighting installation employs 440 industrial-type fittings with 150-W lamps, 130 ten-inch sphere fittings with 100-W lamps and 72 60-W lamps for machine lighting, giving a factory illumination of 9 foot-candles at 10 ft. 6 in. from the ground, and a composing department illumination of 13 foot-candles at 8 ft. 6 in. from the ground.

The Supervisor's Job. By H. E. Johnson

Duties and qualifications

THERE seems to be a lack of appreciation of the necessary qualifications by some concerns when advertising for applicants for the post of supervising electrical engineer. Whether the position entails direct control of labour or not some experience of such control is necessary, yet in many cases one hears of concerns wanting a man to hold down the position in addition to looking after estimating, correspondence, business getting, dealing with architects and consulting engineers and even ordering of materials.

The control of labour is as specialised a position as any in electrical engineering and an essential qualification for the post is that the holder should be first a practical man who has done the job and could do it again if he had to, that he should know his job so well that he will command respect for his decisions, and that his technical ability should be such that he knows the why and wherefore of the product.

It is my experience in the rather specialised branch of the industry I am in contact with that a very different type of workman from that which existed even 10 years back is calling for a rather different kind of supervision than was necessary then. The old "wire-buster," the "heavy-hammer man," and the "spit-and-polisher" is being superseded by a man who has usually been to evening classes and taken a course which has a direct bearing upon his work; a man who thinks and who, knowing his job, also knows the best way to go about it. Rule-of-thumb is giving way to scientific approach to problems and better work is the result.

Supervision of men on outside work, when the staff is of the type mentioned, is mainly concerned with the planning of the work in hand, the economical allocation of labour to the job, and that constant pressing for material that every engineer has experienced at some time.

The efficient supervisor, knowing the conditions on any particular job, will be able to form a very close estimate of the time required to complete any section of the work with the most economical labour cost. Planning the actual schedule of required progress, even if the size of the contract does not demand drawing up such a schedule on paper, should not be neglected, as the wrong ends of some jobs are often tackled first by the charge-hand on the site to suit some preconceived plan of his own which, although perhaps very laudable in idea, has not had the benefit of studied organising experience behind it.

Men often have their own little ways of tackling a particular job, and providing that this way is efficient, *i.e.*, that the result desired is attained without waste of time or the use of more material, your own small preferences should not be insisted upon. Some men need rather more guidance on these matters of progress planning than others, especially where work is being carried out away from the regular twice weekly or perhaps more frequent supervisory visits.

The ideal state of affairs is to so pick and train men that the minimum of supervision is necessary to attain the planned result. Where work is being carried out in close co-operation with builders or other contractors the supervisor should be able to get them to complete those parts of the work which affect his job and which if left till too late will have the effect of holding up his progress. A rather different type of general foreman, *i.e.*, the man responsible for the general progress of the job, building, plastering, etc., is noticeable nowadays, and where in the past the general foreman has personally seen that such things as scaffolding and cutting away were carried out, he is more likely now to refer you to the various charge-hands concerned with such work. This is the result of planning on his part which the conditions of his job have made necessary due to the increased scale and the services installed in these large buildings.

This brings me to another point in the organisation of a contract which although I am aware is taken for granted by most supervisors, is nevertheless worth a mention: that is, the approach to such general foremen by the supervisor with regard to the carrying out of such of their work as is necessary for the efficient progress of his own. The general foreman has generally got his hands pretty full looking after the many contractors on the job in his own province of general building and wants as little to do with such people as electrical contractors and all types of specialised services as possible. Time spent in going over the blue-prints of your own requirements with him is well spent. This should be done before your men start on the job despite the fact that he has had the drawings for weeks or even months. He does not usually "cross his stiles" till he has to and that is not always the best time for the contractor concerned.

Endeavour should be made to confine as far as possible all questions of actual hold-ups or lagging of the builder's part of the work to the general foreman responsible for the contract, with whom the supervisor should as a matter of course be on the best of terms. Close co-operation here is essential and pays in all sorts of ways as it leads to the smooth running of the job.

[*Elec. Rev. photos.*

Electrical Equipment at Sir Joseph Causton & Son's Works. (See preceding pages)

1. Slow moving conveyor for paper conditioning. 2. A row of vertical letterpress machines. 3. Electro-deposition plant and hydraulic moulding press. 4. Electrically heated varnishing machine. 5. A battery of two-revolution presses. 6. Monotype casters

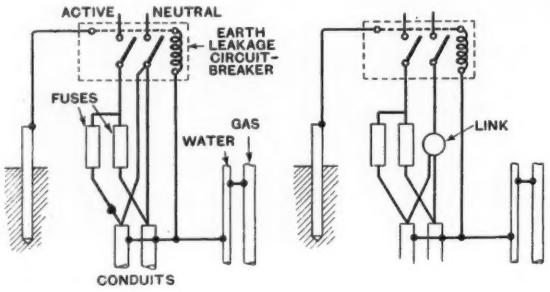
Installation Protection in Australia

The regulations governing the use of earth-leakage circuit-breakers are reviewed by the author, who was an early advocate of this method of protection

By T. C. Gilbert, A.M.I.E.E.

ON May 10th, 1937, the use of earth-leakage circuit-breakers in consumers' installations was made compulsory by the Sydney County Council and other authorities in Australia. The method differs considerably from that established on the Continent, and to a lesser degree in this country, but in Australia the position is complicated by the existence in many cases of neutral earths on consumers' premises, although reliance upon this form of protection has now been abandoned.

The regulations of the Sydney County Council are typical



Incorrect (left) and correct methods of installing a double-pole leakage switch. A neutral link is required in the former

and are contained in various pamphlets issued to contractors and others and in a new section (No. 5) of the Standards Association of Australia Wiring Rules, in which it is stated: "The system of protecting installations against dangerous rises of potential of exposed metal above earth by means of earth-leakage circuit-breakers or relays is of comparatively recent development. Although, as a result of experience with the system in Europe, and to a lesser extent in Australia, certain general principles may be laid down, no properly tested rules or regulations covering the details of the installation of earth-leakage circuit-breakers exist. Accordingly, any rules prepared for this purpose will necessarily be liable to frequent revision in the light of further experience. The Wiring Rules Sectional Committee of the Standards Association of Australia has therefore decided that such rules should not as yet be included in the body of the Wiring Rules, but should be issued as a loose appendix, which may be amended from time to time."

General Requirements

Every electrical installation connected to the mains of the undertaking must be protected against excessive leakage current as under:

(a) In the areas supplied through overhead mains and overhead service lines: By an earth-leakage circuit-breaker or breakers complying with the "Provisional Approval and Test Specification No. C 110" issued by the Standards Association of Australia and installed in accordance with the appropriate requirements of Section 5 of the 1937 Edition of the S.A.A. Wiring Rules.

(b) In the areas supplied through underground cables (not including isolated lengths of underground cable forming part of the overhead system): By bonding the main earthing conductor of the installation to a special terminal attached to the metallic sheathing of the Council's underground cable, this connection being additional to the earthing connection specified in the S.A.A. Wiring Rules.

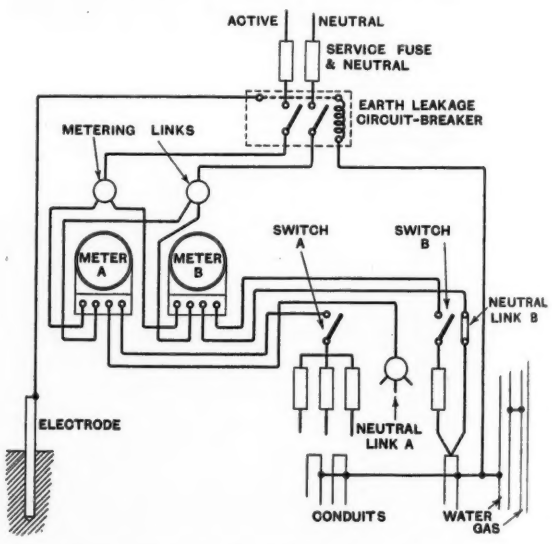
The earth-leakage circuit-breaker and any auxiliary gear required by paragraph (a), together with the necessary connections and also additional earthing conductors necessary to comply with clause (b), must be provided and installed by the owner of the installation. The Council will provide the special terminal on the cable sheath required by clause (b) and its officers will connect the earthing conductor to the special terminal.

Lists of approved equipment (which alone will be connected to the mains) are obtainable from the undertaking. Recognising its inexperience in the matter, the Standards Association of Australia based its specification upon the "Sbik" system developed in Germany, which has been described in these columns. The operating characteristics of the "Sbik" gear are as follows: With 200 ohms in the earth circuit (electrode, additional to any coil impedance) the switch shall operate at 22 V±2 V, and with 800 ohms at not more than 65 V. The Australian specification adopts these requirements *en bloc*, and also wisely specifies a minimum wire size for the coil winding.

The supplementary Rules show that the connections are such that basically the installation is earthed in the traditional manner (solid earthing) and, in addition, the solid earthing system is connected to one end of the trip coil of the switch while the other end of the coil is connected to an independent earthing electrode. The solid earth conductor embraces the gas pipes in the building, and is thence connected to a water pipe. The minimum resistance between the additional electrode and the water pipe must not be less than 100 ohms (Rule 554c) but as contractors may not have the equipment necessary to measure this resistance, the protective system will be regarded as satisfactory if the electrode is more than 6 ft. from the nearest water or gas pipe. The proposed parallel protective systems are not in line with standardised practice abroad, and the Australian authorities have stated that the arrangement is experimental. As some 4,000 switches have already been installed, some views may shortly be available as to how the system is working out.

Neutral Links

The Rules state that where two or more circuits are installed and the solid neutral system is used, then neutral links are required so that the conductors of each outgoing circuit may be disconnected without interfering with the supply to any other circuit. The Council does not insist upon the use of more than one leakage switch per consumer, even when the consumer is supplied at different rates. Where only one switch is used it must be connected between the service cut-outs and the metering links; it becomes a master switch, and each installation must be provided with its own main switch. Should an earth fault occur on one installation, probably the several installations supplied through the leakage switch will all be disconnected. If such an interruption would seriously



An earth-leakage circuit-breaker protecting two installations for one consumer

inconvenience the consumer a separate switch should be used on each installation or even on each circuit.

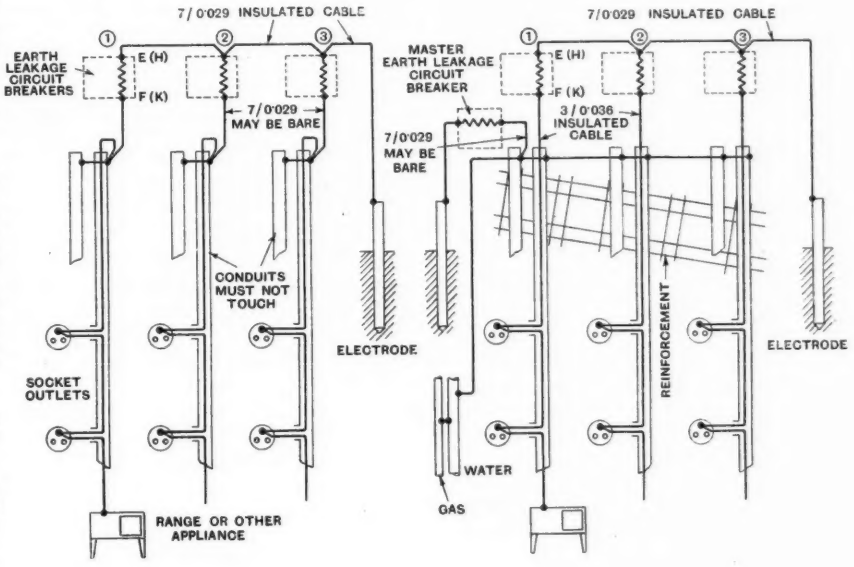
On large installations having loadings in excess of the standard leakage-switch ratings the Rules permit the use of an oil or air circuit-breaker, motor-starting switch or contactor with an earth-leakage switch connected as a relay, the contacts of the leakage switch being connected in series with the low-volt or hold-on coil. A better method, however, is said to be the use of a circuit-closing leakage relay in series with a shunt trip coil on the circuit-breaker, as this will not

be affected by momentary disturbances on the mains and will avoid the noise produced by the low-volt coil. The idea of a circuit-closing earth-leakage switch is new.

Double Insulation

The use of a new form of "consumer's mains," running between the point of attachment and the consumer's earth-leakage switch, is catered for under the new Rule No. 556. This requires a consumer's mains serving an installation protected by an earth-leakage switch to be provided with double insulation, *i.e.*, further insulation between the usual insulating envelope and any earthed metal.

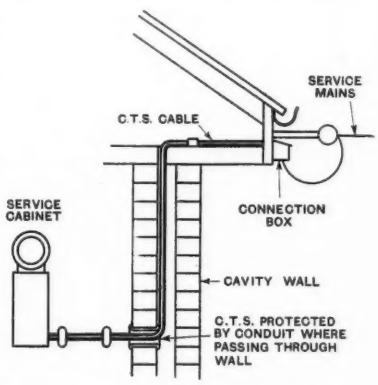
The following types of wiring are "double-insulated": (1) Suitable 250-V grade cables in insulating conduits or in metal conduits with insulated linings. (2) C.t.s. cables run in metal conduit or, with the approval of the supply authority, without such additional protection. Since this type of cable cannot be exposed to sunlight, some type of connector box must be provided wherein the joint to weather-proof cables can be made. (3) Rubber-compound cables having a minimum thickness of compound covering equal to the combined thickness of the insulation and sheathing of c.t.s. cables, run in conduit, or, with the approval of the authority, without such protection. (4) A type of cable in which the neutral conductor completely surrounds all other conductors and is itself covered with insulation equivalent to that required for cables of the normal type.



Left: Standard conduit wiring. The conduits for each installation are prevented from touching other conduits or metallic structures. Minimum insulation resistance 1,000 ohms. Right: The insulated earth wire method used where steel conduits cannot be isolated. All conduits are bonded together and to the water- and gas-pipes. A master earth-leakage circuit-breaker is necessary in addition to one for each installation

Where arrangement (2), (3) or (4) is used the connections to the service lines and/or fuses must be made with 250-V grade cable, connected to the c.t.s. compound, or special cables in a suitable junction box. Metallic conduit enclosing consumer's mains must be provided with an insulating bell-mouth of 3-in. minimum overall length.

The requirement that the gas pipe shall be bonded to the water pipe does not mean that a wire must be taken direct from the conduit to the gas pipe, nor that a wire must be taken from the earth connection on the water pipe to the gas pipe. Water and gas pipes have only to be connected together at some accessible position. The 1934 Rules specified that bare earth wire *must* be used in all cases, but the 1937 Rules (523a (i) state that it *may* be used., no objection being raised to the use of insulated earth wires. Under the conditions of use in Australia insulated earth wires become necessary in some cases.



A method of installing double-insulated consumers' mains

Multiple Installations

It is in connection with multiple installations, however, that the Sydney County Council has issued its most elaborate instructions. The requirements are generally set out in Section 5 of the Wiring Rules and many instructional leaflets have been produced by the Council. Where several consumers occupy one building, as in blocks of flats, or where one consumer protects various portions of his installation separately, then precautions must be taken to prevent an earth fault in one section from causing unwanted operation of other leakage switches.

Fundamentally, the problem is simply that of keeping the metallic portion (including the frames and earthing conductors) of each installation isolated by keeping the conduit apart from metal structures and from the conduits of other installations, or by the use of all-insulated material, including insulated conduit and t.r.s. cables. In all cases, the earthing conductors of each installation must be kept electrically clear of other earthing conductors right up to the terminal of its own earth-leakage switch.

This can be accomplished by using standard steel conduit where adequate isolation is possible. In small blocks of flats with brick walls and wooden floors a bare 7/0.029 wire is run in the conduit to the third pin of the socket outlets and to other appliances to be earthed, the conduits for each flat being taken to the earth-leakage switch for that flat. The conduits for one flat must not be allowed to touch the conduits for the other flats, nor touch any water, gas or refrigerator pipes, telephone cables or other metallic structures, and earthing connections are not made to the water or gas pipes.

Where isolation of conduits and metallic structures or of the conduits for separate installations, as in reinforced concrete buildings, is not possible, a non-metallic system of wiring, such as c.t.s. cable or insulated conduit, is required. When c.t.s. cable is used, since the conductor is double-insulated, conduits need not be earthed and conduits for different installations may be allowed to touch.

Where three-core c.t.s. is used the earth wire may be the same size as the active conductor, provided it is not less than 3/0.029. No connection is made to the water or gas pipes. However, should rising mains of ordinary rubber-insulated cable be used, the conduit enclosing them must be protected by a main earth-leakage switch, and the connections for this portion of the installation must be treated as part of an ordinary simple installation, the conduit protecting the rising mains being connected to the water and gas pipes as well as to the "conduit" terminal of the main earth-leakage switch. The main earth wire is insulated, as it is in all multiple installations.

Insulated Earth Wire System

Another method of protection, known as the insulated earth wire system, though not completely selective, has proved satisfactory for the independent protection of motors and other portions of a given installation. This system, which is approved by the Council for the protection of separate installations in blocks of flats, was one of the first systems advocated for use in this country with earth-leakage switches.

The system permits the use of non-isolated steel conduits but necessitates the use of insulated earthing conductors and of a main earth-leakage switch for the building in addition to a leakage switch for each installation. While the sockets and appliances in each installation are separately and thus selectively protected, the wiring in the building is protected only as a whole and selectivity in conduit faults depends upon

the blowing of circuit fuses. I believe that this method was first described in my book, published in 1932, and was then defended upon the grounds that the majority of earth faults took place upon appliances and their connecting flexible conductors, and only a very small proportion in the fixed wiring. The number of new installations employing this method is growing in Australia, which argues that the system merits consideration for this country also. In this system gas and water pipes are again brought into the protective circuit with the conduits, and without loss of selectivity.

The Rules state that if the earthing conductors between the sockets, appliances, &c., and the earth-leakage switch are enclosed in conduit, these conductors need not be larger than 3/.036; this appears to be an unnecessarily large wire, and in my early advocacy of the system it was stated that an ordinary bell wire would be sufficient, as the system can be brought under almost continuous test. The main earth-leakage switch must be large enough to carry the maximum demand of all the consumers, without any allowance for diversity.

Special arrangements are required for water heaters, and one of the Council's publications points out that in order to obtain selective operation the earth circuits for each installation must be kept separate. The frames of water heaters are required to be connected to the earth-leakage switch, but as the frames of all heaters would be normally bonded by their common connection to the water pipe, insulating joints are needed in the hot and cold water connections to each heater. This method of obtaining selectivity was advocated by myself in these columns some five years ago, and practical experience bears out the views then expressed. I took the point a little further, however, and suggested the use of similar insulating sections in conduit runs, with a view to securing the full selectivity still sought by the Australian engineers. Considerable progress has been made, however, during the three years in which the Australian authorities have been seriously investigating the earth-leakage switch, and the next few years should provide valuable data concerning the arrangements that have been described above.

That they may appear cumbersome and expensive to us in this country merely emphasises the complete failure of protective multiple earthing. Some of the difficulties that have been overcome were distinct legacies from that outworn system. New Zealand engineers are now investigating the earth-leakage switch at first hand in Germany, which may indicate the loss of even that last stronghold of protective multiple earthing.

High-voltage Transmission in London

IN describing in our issue of January 21st the 150,000-kVA sub-station which the County of London Electric Supply Co., Ltd., has recently constructed at Streatham, we referred to the laying of three 66-kV oil-filled cables from Barking power station to the new distribution centre. The distance is sixteen miles, which is said to be the longest single run of super-tension cable installed in this country.

Each of the three feeders consists of three single-core 0.35 sq. in. oil-filled (Pirelli system) impregnated-paper-insulated double-lead-sheathed cables with a carrying capacity of 400 A, *i.e.*, approximately 46,000 kVA. At the same time a 6-in. c.i. pipe was laid at the same depth as the lowest feeder at 18-in. centres to provide for a future fourth feeder.

The other two feeders are spaced 18 in. above these at a normal depth of 3 ft. 6 in. below the ground surface, but varying considerably due to obstacles encountered. In certain cases, *e.g.*, where the cables are in conduits at road headings, the sectional area of the conductors was increased to 0.5 sq. in. to prevent the operating temperature exceeding 75 deg. C.

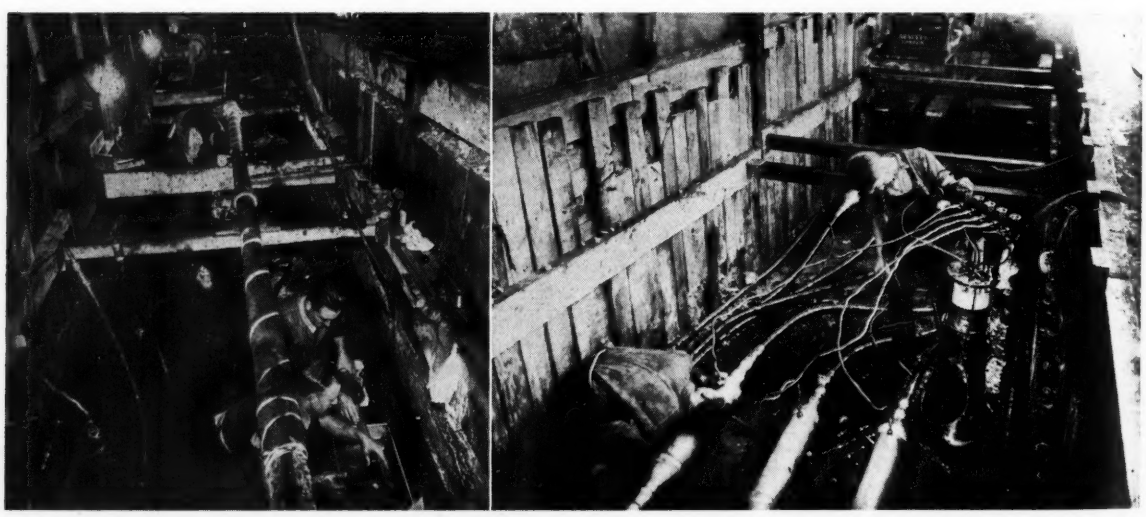
Stop or barrier joints are provided at intervals of up to 2,000 yds. on level routes for the purpose of limiting the transient and static oil pressures, but on considerable gradients the distance may be only a few hundred yards. Each section of cable between stop joints constitutes a separate oil system, and each phase of a feeder is independently fed from welded galvanised-steel pressure tanks in which are hermetically sealed collapsible air vessels. There are at least nine tanks at each feeding point, but where it is expedient to feed in both directions eighteen are needed, provision being made for a fourth feeder.

Pressure tanks with the stop joints are housed in reinforced concrete underground chambers with manhole access and measuring from 38 ft. to 42 ft. in length, 8 ft. to 8 ft. 6 in. in width, and 7 ft. in height, according to the number of tanks accommodated. The normal thickness of the floors and sides of these chambers, of which there are thirty-five along the route, is 12 in. Oil connections between the tanks and stop joints are of ½-in. bore copper pipes. The three phases are coupled to manifolding cocks, so that if one tank is out of commission the feeder can still be run at reduced oil pressure on restricted load.

Straight-through joints provide for an unrestricted flow of oil through the cable duct and do not admit the oil to the cable. A common bay, 46 ft. by 7 ft. by 4 ft. 9 in. deep, is excavated for the joints of all three feeders.

In addition to the power cables, six l.c. and s.w.a. auxiliary cables have been laid between the lower feeder and the c.i. pipe. They comprise two three-core and one six-core pilots, two 50-pair 50-lb. dry-core cables for telephone and supervisory circuits, and one fifteen-core cable for the low-oil-pressure indicators. Except for the 50-pair cables, the dielectric consists of impregnated paper.

In the event of an oil leak in any phase of a power cable, the difference in oil pressure between it and an adjacent sound phase actuates a metallic bellows, closing a mercury switch which operates an alarm at one end of the feeder before the loss of oil is enough to endanger the dielectric. An electric localising system on the Wheatstone bridge principle enables the mercury switch that has operated to be quickly ascertained. The consulting engineers to the County of London Electric Supply Co. are Messrs. Merz and McLellan, and the contract for the manufacture and installation of the cables was divided in approximately equal sections between British Insulated Cables, Ltd., Callender's Cable & Construction Co., Ltd. (including the crossing of the Thames *via* the County Co.'s cable tunnel at Barking, which involved new problems in oil-filled cable technique), W. T. Henley's Telegraph Works Co., Ltd., and the Pirelli-General Cable Works, Ltd.



Working on the 66-kV oil-filled cables. Left: Insulating straight-through joints. Right: Impregnating the joints

Electricity in Mines. By T. David Jones and C. S. Chubb

How the requirements are being met

NO better record of the progress of the use of electricity in the mines of this country can be obtained than is given by the report of the Electrical Inspector of Mines, Mr. J. A. B. Horsley. These reports show a constant state of expansion in all directions for many years past. The latest report available is for 1936, since when there appears to have been an intensification of the application of electricity for the excavation of the mineral and for transport.

A good guide is the h.p. of motors installed, which increased by 77,092 during that year (the largest increment yet recorded), to which Scotland has contributed to a much greater extent than any of the others, as a very extensive mechanisation has been carried out there of late years. The h.p. of a.c. motors installed has shown a steady increase for a number of years until 1936, when it slightly decreased for the country as a whole.

In his evidence before the Royal Commission the Electrical Inspector on Safety in Coal Mines said that "Notwithstanding the great increase in the use of electricity, whether measured by the horsepower of the motors installed, or by the number of coal-cutting machines in use, or by the output of mineral got by electrical machine mining, the accidents due to electricity exhibited no corresponding increase, but were, on the contrary, more or less constant in number . . . improvement in the plant and in its application having offset the augmented use." That statement is one of which both manufacturers and operatives may be justifiably proud.

Professor David Jones and his colleague are engaged in the Mining Department of University College, Cardiff, and are therefore closely in touch with all advances in mining technique. They show how rapidly electricity has made headway underground in recent years and review some of the latest developments

The use of electricity in mines is accompanied by additional risks due to rougher usage and the greater difficulties of maintenance. Extremes of dust, dirt, damp and heat have to be provided for, as well as damage from sharp stones, falls and shot firing. Also, the presence of inflammable gas has to be reckoned with in many mines, and apparatus has to be constructed and maintained so that an explosive mixture of that gas with air may not be ignited.

The findings of the Safety in Mines Research Board have resulted in the drawing up of general instructions as to the design of apparatus, and facilities for testing. Originally these tests were optional, but the certificate of the Buxton testing station is now necessary before apparatus may be installed in places to which Section 60 of the Coal Mines Act, 1911, applies. So long as such apparatus is maintained in good condition and handled in a reasonable manner no danger will arise from its use.

The designing of flameproof apparatus is perhaps the only major point of progress which originated in a need of the mining industry. Certificates are of different grades, one for mines as a whole, and another for gas-air mixtures containing hydrogen, while a universal certificate covers any inflammable gaseous mixture.

Colliery Lighting

In 1934 regulations fixing the minimum candle power of miners' lamps were made and have resulted in considerable improvement in the design of lighting equipment.

A recent B.S. Specification for bulbs ensures that they are as efficient as a reasonable length of life allows. There seems a likelihood of the efficiency being still further increased at the expense of the life of the bulbs. Also, the use of krypton gas in the bulb leads to an increase in efficiency by from 20 to 30 per cent. compared with those filled with argon gas. Bulbs of this kind maintain their increased efficiency for 600 hours, which is as long as is necessary.

At present practically every miner carries his lamp, but in some instances the lighting of the working place is being done by more powerful lighting units connected to the electricity or compressed air mains. The use of "mains" lighting in the working places is limited by the Regulations very drastically, but where permissible it has resulted in more and better work and greater safety. A type of fitting suitable for the hard usage and to the need for constant dismantling and moving forward has been developed. The usual type of installation is a lighting circuit transformed down at the place of use from 400 V to 100 V or less. Where this type of installation is not permissible, the alternative is to use lamps in which electricity is generated by a compressed air motor; these are allowed in any part of the mine.

A form of mercury vapour discharge lamp has been evolved which is not critical as to the position in which it operates, and can be applied to mains lighting sets and to compressed air electric lamps underground. In addition to its high efficiency its peculiar light enables the shale or "dirt" in the coal to be much more readily distinguishable, and for this reason it is used on the picking belts also.

Winding

There has been a very decided tendency for winding operations to change over to electricity. Many new pits are equipped with electric winders, and old ones are being converted from steam when modernised. The electrical equipment is mostly of normal type and progress lies in the increase in the number of units rather than in the design of the units themselves.

One of the most recent developments is that of push-button control of winding operations. By eliminating manipulation by the engineman coupled with making the loading and discharging automatic, each operation takes only the bare minimum of time required for it. Saving of time in winding is of prime importance because the quantity which can be transported through the shafts forms the maximum possible output of the mine. As many mines have reached that maximum further expansion is only feasible by radically altering the winding arrangements.

Winding is divisible into two main classes according to the method of carrying the mineral in the shaft, namely, skip winding, in which the mineral is carried by tipping it into a container which carries it to the surface and there discharges it, or cage winding when the wagon or train carrying the mineral is loaded into a cage and carried to the surface, where it continues its journey to the discharging point.

Manipulation in the two cases is quite different. In the first case the skip comes to certain positions for charge and discharge, and the actual position is not critical. In the latter case the cage usually rises above "keps" at the surface —the engine is reversed and the cage is rested on the keps, and the tram discharged. Then an empty tram is loaded in place of the full one and the cage is lifted off the keps and the keps being withdrawn the cage descends. Thus the skip winding cycle is a very simple one of stop and start, whereas the cage cycle is one of some complication.

There is another variation of winding, the Koepi system, in which instead of the ropes being wound on a drum so that one coils on whilst the other uncoils, the two cages or skips are attached to one rope which passes around a driving wheel. In this type of winder there is usually a certain amount of creep of the rope relative to the driving wheel, so that apparatus intended to operate according to the position of the cages in the shaft require occasional adjustment, especially if there is any heavy braking during the winding cycle. This complicates the operation of manual control and makes automatic control still more difficult. Again, the winding load is rarely completely balanced, so that the torque required varies at different parts of the wind and the same amount of control does not have the same effect.

Ward-Leonard Control

The simplest case is that of the skip winding with d.c. supply or with Ward-Leonard control, an example which is the system of the Mufulira Copper Mines, Ltd. This winder takes a gross load of 22,000 lb. from a depth of 1,000 ft., and is operated by a 1,200-h.p. synchronous motor, an hydraulic coupling for slip regulation, an 11-ton flywheel and a 1,120-kW d.c. generator. The driving motors are 1,600 r.m.s. h.p. (peak 3,200 h.p.) 600-290 r.p.m.

In addition to the hand-operated Ward-Leonard control, the winder may be operated by push-button from each level of the mine, or by fully automatic control. The latter is the normal method, the winder running as long as the supply of ore continues or until the end of the shift. The loading and discharging mechanism is also interlocked with the winding so as to be fully automatic.

With d.c. or Ward-Leonard control it is a simple matter to control the greater part of the wind by the electrical control lever. The position of the lever corresponds closely to the variation of speed. In a.c. winders this is not the case, and the advantages of electrical or dynamic braking have been hitherto generally limited to braking at speeds greater than synchronous speeds or to counter-current braking. The former is only applicable at high speeds, and with the latter there is a danger of the load running away at the time of

Mining Electrical Engineers

Annual convention at Glasgow

TEMPORARILY for six months the focus of the Empire seems to have moved north to Glasgow, the second city of Scotland, where the Bellahouston Park Exhibition, at first regarded as an ambitious venture, is now admitted to be demonstrating clearly that adversity has failed either to curb Scotland's commercial initiative or diminish her industrial capacity.

During the Exhibition period the city authorities are entertaining some fifty official assemblies, among them the Association of Mining Electrical Engineers, which held its annual convention last week by invitation of the West of Scotland Branch. On three previous occasions the annual meeting has been held in Scotland (in 1911, 1924 and 1933), and the attendance was larger than ever, the 486 badges issued last week excluding late entrants.

The chief event on the Tuesday was a golf competition (one round of eighteen holes) on the Pollock course for the handsome silver cup and replica presented by Mr. W. A. Hayes (Wigan) which were won for the second year in succession by Mr. G. A. McLennan (Lothians Branch), who also secured a prize (pair of tankards) for the best net score under the same conditions as last year at Southport. The second prize (cocktail set in case) went to Mr. Robert White and the third (fitted picnic case) to Mr. G. H. Dinwoodie, both of the West of Scotland Branch.

An informal reunion in the evening with light refreshments at the Grand Hotel, the Convention headquarters, afforded an opportunity of making and renewing acquaintance with members from nearly all branches.

Tour of the Empire Exhibition

On the Wednesday morning motor coaches carried delegates and their ladies south-westward across the river to Bellahouston Park for a first tour of the Empire Exhibition. The Palace of Engineering, the largest building in the show, naturally attracted prior attention. The interior decoration enhances the special finish of many of the exhibits, which are, however, largely unattended. An outstanding building is the United Kingdom Government Pavilion, of impressively lofty design. Complicated processes are traced out by moving lines of coloured light and simplified by working models, while essential details are clarified by short cinema films introduced into various sections of the exhibits, many of which are demonstrated by members of the staff of the Royal Technical College, Glasgow. Others which are unattended are explained in conversational tones by concealed loud speakers (sound-on-film recording) and the display by the Department of Scientific and Industrial Research with the assistance of officials loaned by the Science Museum, South Kensington, the theme being the close relationship now existing between science and the three national industries of shipbuilding; iron and steel production; and coal mining, utilisation and by-product processing.

A fine working model of a coal mine more than 200 sq. ft. in area and 15 ft. in height, provided by the Mining Association of Great Britain, illustrates underground and surface workings in detail. The Safety in Mines Research Board is represented, and examples of better utilisation include a diagrammatic representation of how the amount of electricity obtainable from a ton of coal has been increased by more than 60 per cent. in the last twelve years and that, in addition, improvements in electric lamps and other appliances enable electricity to be used more economically. Incidentally, a recent advance has been the marketing of lamp bulbs containing krypton gas instead of argon (both extracted from the atmosphere) which has effected an increase of over 20 per cent. in the amount of light obtainable from a miner's lamp without impairing its life or making any further demand upon its battery.

Clyde Cruise

At the luncheon on Wednesday at the Grand Hotel (350 attended) Mr. S. Winstanley, branch president, voiced a welcome on behalf of the West of Scotland Branch and, in reply, Mr. J. A. Bernard Horsley, national president, expressed appreciation of the efforts of the several Convention committees. An official photograph was successfully taken between heavy showers of rain and the party then returned to the Exhibition for an afternoon tour.

Later the same evening there was a civic reception by the Lord Provost and city magistrates at the handsome city chambers in generously hospitable style. Sir John Stewart's speech of welcome was responded to by Mr. Horsley and Mr. H. A. McGuffie (president-elect), after which the guests danced with an energy at which southerners marvelled.

The somewhat boisterous weather had cleared before delegates made an early embarkation on Thursday morning for an all-day cruise in the T.S. *Duchess of Hamilton* down the River Clyde and along the Renfrewshire coast, which afforded an opportunity of noting that many of the Clyde-side shipyards are busily engaged once more, and the advanced state of construction of the new Cunarder, sister ship to the *Queen Mary*. It was also observed that what appear to be boiler-house extensions to the Yoker power station of the Clyde Valley E.P. Co. have reached roof level. Luncheon and dinner were served on board, and the return trip in the evening by way of Gourock and thence by special train, stopping at Ibrox station, permitted those who chose to do so to pay their third visit to the Empire Exhibition. Unfortunately, the light evenings at this time of year do not permit the coloured illuminations to be properly appreciated.

Annual Dinner

On the Friday morning two parties set out in motor coaches for Aberfoyle and the Trossachs, stopping at hotels *en route* for coffee and returning in time for luncheon. In the evening there was the Association's annual dinner, followed by dancing to a late hour. During an interval in the speech-making Mrs. H. A. McGuffie presented the golf prizes.

Following the loyal toast, "The A.M.E.E." was proposed by Lord Inverclyde, who said that the choice of H.M. Chief Electrical Inspector of Mines as president last year was striking testimony of the growth of the Association's prestige during the last thirty years. Its members could claim to have reduced to the minimum the dangers attending the uses of electricity in mines, and much of their success might perhaps be due to the fact that the A.M.E.E. had never adopted an exclusive policy. It concerned itself with the applications of electricity to any and all kinds of mining and not one of the 600 men who had obtained the Association's certificates had ever been out of employment, which was an indication of the high standard of the Association's examinations and the thoroughness of its examiners. But no one could be sure of the future, and he therefore hoped the Association's next step would be the establishment of a benevolent fund.

Mr. H. A. McGuffie (the new president) replied, dealing as is customary with the work of the Association, and paying a special tribute to Mr. W. G. Gibb (branch treasurer and hon. secretary) and the several entertainment committees for the excellence of the Convention organisation.

"The Corporation of Glasgow" was proposed by Mr. A. Anderson (past president) and responded to by Bailie W. Elder, deputising for the Lord Provost. The toast of "The Mining Industry" was proposed by Mr. A. W. Williams (past president) and acknowledged by Major D. H. Currer-Briggs (president of the National Association of Colliery Managers). For "Our Guests," proposed by Mr. S. Winstanley (branch president), Mr. R. W. Brown (president of the Lanarkshire Coal Owners' Association) responded, and the health of the chairman, proposed by Mr. J. A. B. Horsley, was accorded musical honours.

Business Meetings

Meetings of several committees held during the week culminated in the council meeting on the Friday morning. The annual general meeting followed in the afternoon, with Mr. J. A. B. Horsley in the chair. After the formal adoption of reports and accounts, the chairman referred to the death of

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Electricity in Mines (*Concluded from preceding page*)

change-over. In one form of control, however, the dynamic braking can be used down to very low speeds and the mechanical brake is only needed to hold the winder at rest and for the last few feet of the wind. This is achieved by exciting the stator with d.c. and connecting the rotor windings to a loading resistance, the exciting current and external resistance being interconnected so that effective braking is obtained at the lower speeds by reducing the loading resistance. A motor of this type is operating successfully at the Combie Colliery of the Fife Coal Co.

The electrification of coal-face machinery was held back for many years, because the drilling of shot holes required compressed air and consequently the face machinery was also driven by compressed air. Now there is available a very efficient rotary drill running on low voltage but high frequency and supplied through a frequency changer of a rather novel design. This drill is capable of boring in coal or stone, and when drilling in the latter it is claimed that the amount of fine dust produced is very much less. This is of great importance in those districts where the miners are liable to silicosis—a disease of the lungs attributed to the inhaling of fine stone dust.

Mr. H. W. Clothier, who was one of the Association's first members and had always extended extraordinary facilities for his staff to further the aims and objects of the Association. An official letter of sympathy is being sent to his widow and surviving children. The chairman then announced that Mr. C. P. Sparks (consultant), who was a founder member of the A.M.E.E., had been elected an honorary member, as had also Mr. C. St. C. Saunders, who for health reasons is retiring on June 30th after many years' service as the Association's general secretary. Mr. J. H. W. Diaper has been appointed in his place, and a testimonial fund is to be raised for the retiring secretary.

Mr. J. A. B. Horsley next reported that during his year of office he had visited all the branches and sub-branches and had experienced no difficulty in combining his dual offices. He had not been able to accomplish all he had wished to do, but the modification of the Association's by-laws would improve the working of the numerous committees. At present there was no obligation upon the president to be active or otherwise, and Mr. Horsley's parting suggestion was that the organisation would benefit from the appointment of a small executive committee, possibly composed of the conveners of the more important standing committees.

The election of new officers was announced as follows: President, Mr. H. A. McGuffie (consultant, West of Scotland Branch); first vice-president, Mr. T. H. Williams (South-East Yorks Branch); second vice-president, Mr. S. B. Haslam (South Wales Branch); and hon. treasurer, Mr. F. Beckett (West of Scotland Branch).

At the A.M.E.E. Convention (left to right)—Mr. W. T. Anderson (past-president) with Mrs. H. A. McGuffie (wife of the new president); a group at Aberfoyle; and Mr. J. R. Cowie (past-president) [*Elec. Rev. photos.*

Closer Coal-electricity Link

Mr. H. A. McGuffie then took the chair and, after the appointment of auditors and the adoption of votes of thanks to officials, the presidential address was delivered in abstract, being longer than usual this year.

The first essential to their work as mining electrical engineers, said the president, was a cheap and abundant supply of electricity, continuous and reliable. In almost every mining district there was now a public supply available, in most cases at reasonable prices. Approximately 96.5 per cent. of the electricity generated for sale was produced by steam stations, of which approximately 95 per cent. were coal burning. It would appear, therefore, that unless special reasons existed the coal producer should be in a position to generate electricity at as low a cost as, probably in many cases at a lower cost than, that of the public supply, because he could utilise unsaleable fuels and the lower grade surpluses. Considerable progress had been made in the development of plant for the economical use of low-grade fuels and, while it was possible that in certain areas it might ultimately pay the larger generating authorities to install such plant in their power stations and to purchase fuels which were to-day unsaleable, it would probably be found that transport charges and transport difficulties would be such as to limit this business to special cases.

The question of a public supply or private generation must, however, be settled in every case on its merits. On broad principles it might be argued that the business of the coal industry was to win coal as cheaply as possible and that the generation of electricity should be left to those whose whole business it was. He was of the opinion that in the near future coal production and the generation of electricity must be more closely linked in the national schemes and that, despite a certain lack of success in waste heat and other stations established near the collieries on an experimental scale, the inter-relation of cheap fuel, solid and gaseous by product recovery, and the production of electricity for nation-wide purposes, would bring about the development of super power stations in a number of the colliery areas. The solution might be found in combined action on the part of the Government and the coal industry. It was to be noted that the Government and not the local authority was indicated; the latter in most cases had to consider other interests which were not national. The economic generation and distribution of electricity was, and should be, a national service.

To-day, in small collieries, there was no reason why all surface and underground power requirements should not be met by electricity as the basic power. From costs available, it would appear to be a much cheaper proposition to equip the small colliery for the use of purchased electricity than to install boilers, chimney, steam piping, steam winder, engine-driven fan, &c. In such cases, however, the reliability and continuity of the electricity supply service became all-important factors. The risks involved, particularly those of supply through long overhead lines, must be carefully assessed. It was obvious that there must be no more than a negligible risk of shut-down of the vital services on which men's lives might depend.

The case of a group of small collieries which could be supplied by an internal electrical ring-main was less favourable to the public supply and if, in conjunction with the colliery group, ironworks, coke ovens, &c., were operated, and gas or exhaust steam was available, accumulated data showed that electricity could be generated privately and distributed at a cost much below that of the public supply. For so long as unsaleable low-grade fuels had to be disposed of, or waste heat was available, the total colliery costs of electrical generation and distribution must be appreciably lower than any charges for public supply.

This was not the whole story, of course; circumstances had led to the adoption of the public supply in many cases when the collieries acted as co-operators in a national electricity scheme, generating at the pits and delivering energy to the common public mains and drawing upon these common mains for the electrical requirements of the larger collieries; in these circumstances there was possible justification for general use of the outside supply.

Colliery Power Station Figures

One of the larger colliery power stations had an output of approximately 72,000,000 kWh per annum, the cost per kWh being 0.265d. Another large group generated approximately 27,000,000 kWh per annum, the average cost being 0.276d. Two of the largest colliery companies in Scotland produced between them a total of over 146,000,000 kWh per annum. Electricity would, in most instances, be generated by private plant at the collieries at a figure not exceeding 0.3d. per kWh. Straight exhaust and mixed pressure turbines combined with exhaust steam storage, or heat accumulators, had been producing electricity with high reliability and at net costs which had saved very large sums of money.

The load factor at collieries in general was not good, and this was the reason for the unfavourable prices frequently quoted by the public electricity supply authorities. The position in this respect was improving, due, among other causes, to the additional power that was required for face plant, &c., which was in operation on the "back shift." In many cases arrangements had also been made to "sump," or store, water during the ordinary operating period of the colliery, the water being pumped to surface after the "day working shift" was

finished. Colliery engineers were strongly recommended to give a little thought to this matter as it would be found that where electricity was being purchased from an outside source, improvement of the load factor would reduce the average cost per kWh, and the additional cost of providing water storage would in most cases be justified. These remarks particularly applied where electricity was purchased on a kVA maximum demand basis.

The maintenance of a high p.f. was of particular importance to colliery engineers because otherwise the losses in the long underground transmission lines might be serious. Expenditure on machinery which had inherently good p.f. or on apparatus to correct unavoidable low p.f. was, in nearly every case, justified from both the voltage regulation point of view and the cost per kWh delivered to the working load.

A.C. or D.C.?

To-day about 85 per cent. of the mines making use of electricity did so in the form of a.c. For motors, such as winders, which demand high starting torque and speed variations, d.c. continued to be the more suitable. The advantages of a.c. transmission were such, however, as to justify its use with suitably equipped converting plant to supply d.c. near the motors. Regarding standardisation of voltage there was still a great deal to be done. For a.c. working 3.3 kV had now become standard for local distribution and for the operation of the larger motors in and about the collieries; for transmission between the surface and the main underground sub-stations 6.6 kV was being introduced and in one of the South African mines 20 kV had actually been made use of underground. At the larger collieries a.c. was commonly generated at 3.3 kV and at this pressure was transmitted underground. For the smaller motors, such as screens, washers, workshops, &c., the pressure was transformed to 550 V rather than to 440 V.

In most up-to-date collieries lighting was dealt with separately, 110 V now being favoured; also for supplying small motors, such as for drills, this low voltage had many advantages from a safety point of view, especially in wet mines. For operating bells and other signalling apparatus, the maximum was 25 V excepting in the case of a.c. transformer-fed bells, when, say, 12 to 15 V was adopted.

Winding had now become one of the most important electric drives; the present day electrical winder was undoubtedly one of the finest pieces of machinery met with in mining practice. In small and medium-sized collieries, such as were met with in Scotland, direct a.c. winding was meeting all requirements; in the larger collieries d.c. winders on the Ward-Leonard system had proved very satisfactory. Skip winding was now being arranged for in many pits and also automatic winding control.

Fan Drives

The adoption of electric power for fan drives had lagged behind the development of the other electric drives in and about collieries. Probably this had been due to the reluctance to experiment with so vital and continuous a duty as that of the main fan. There were now, however, signs that electric driving had proved its value in this field.

Where mixed pressure turbines with exhaust steam accumulators were employed for generating purposes, a very efficient and reliable arrangement was to couple a high-speed steam engine to the fan, this engine exhausting into the steam accumulator. A variable-speed or slip-ring motor fitted with a slip regulator was also coupled to the fan shaft and operated by a pressure piston connected to the accumulator. By this means the speed of the motor was varied in accordance with the steam pressure in the accumulator. This system had many advantages.

The screening and washing plant was frequently the heaviest load which had to be dealt with on the surface, being commonly fitted with from ten to fifteen motors. The modern practice was to centralise the control of all these motors at one point. Interlocked push-button starters ensured correct sequence.

The cost of wiring colliery buildings with twin v.i.r. single wire armoured and braided cable, including suitable fittings for lighting, had been found in many instances to be less than the usual arrangements of v.i.r. cable in tubing. The armoured cable system was undoubtedly a very sound and safe arrangement. British cable makers would supply a suitable cable for almost any underground condition, but there was still considerable difference of opinion as to the best type of light trailing cable for small electric drills, &c., operating at 100 to 120 V.

Suitable a.c. switchgear was now available for almost all underground mining conditions. One point in connection with leakage protection which required to be investigated by the manufacturers was the method at present in use of giving the percentage of the circuit current at which the out-of-balance current on the core balance transformers would trip the switch. Would it not be more satisfactory to give a definite current value for the leakage trips?

Oil-immersed switchgear appeared to predominate underground, though there was now a tendency to make more use of air-break switchgear. It was now becoming common practice to switch squirrel-cage motors of sizes up to 50 or 60 h.p. direct on to the system. The development of the right design of transformer to meet the severe conditions which existed in underground working had not been rapid, but it could be said that the apparatus now supplied truly represented a trouble-free design. Regular examination of the oil, for detecting either moisture or signs of sludging, did not always receive the attention it ought to.

For the pumping of water underground turbine pumps capable of dealing with 2,500 gall. per min. against a head of 1,600 ft., driven by motors of 1,000 h.p., had been installed in this country and were operating in an efficient and satisfactory manner. A vast improvement had taken place in the design of small pumps for " inbye " work.

In most mines a large proportion of the electricity supplied for underground purposes was used for haulage. In fact, some of the large haulages were simply modified winders fitted with motors up to 500 h.p., being operated entirely by electrical control. Clutch gear was still extensively employed on the smaller haulers. The day of belts and large spur and pinion wheels was fast approaching a close. Electricity was almost exclusively used for driving small fans for " inbye " development work and boosting the main ventilation.

With regard to equipment used and the face, there were coalcutters fitted with 50 h.p. motors, and the rapid improvement in the design of conveying and loading plant was astonishing.

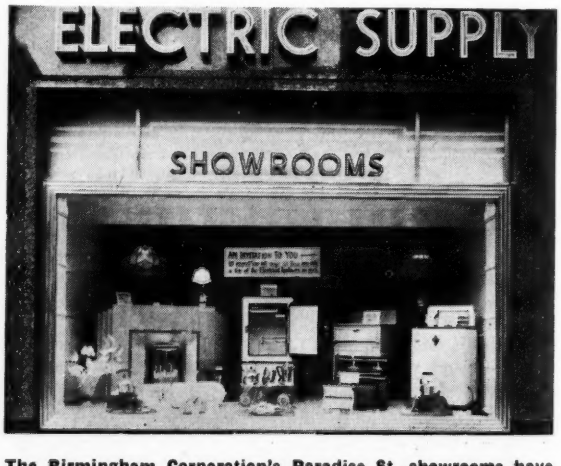
Control of Face Plant

The problems of the electrical control of face plant had always been severe. Many engineers were of the opinion that a halt should be called and, if possible, part of the complicated and expensive trip gear, &c., be removed from the gate-end boxes to a more suitable position, thereby reducing the size and weight of the gate-end boxes. It was not uncommon to find at the face voltage drops of 50 and even 100 V on 500 V circuits. Under these conditions electrical plant could not operate in an efficient manner. Possibly the trouble was for the moment due to the sudden large increase of plant and power required at the face, and might in time be rectified by increases in cables, also re-arranging the transformer positions, &c.

Little had yet been done to apply lighting " inbye " or near the face to the extent that was hoped for a few years ago. Several face lighting systems had been tested, but so far nothing very definite had resulted. There was here a field for investigation and development because, owing to the extensive use of machinery " inbye," good lighting had now become essential.

Signalling underground and to the surface was now almost entirely carried out by telephones and bells. To the immediate past president of the Association, Mr. Horsley, great credit was due for the manner in which this difficult subject was dealt with. Mr. Horsley fully appreciated that the Leclanché cell, with its high maintenance charges, could not continue to meet the requirements of large installations: he therefore pressed and encouraged the manufacturers until a suitable and safe arrangement of transformers and bells was put on the market.

The president's conclusions were that the prices of certain items of plant, such as switchgear, were too high, possibly due to elaboration. He had a strong opinion that there was scope for simplification of design.



The Birmingham Corporation's Paradise St. showrooms have been improved by the addition of a new entrance and show window (illustrated above)

Activities of the I.E.C.

By a Correspondent

The proposals of the various advisory committees which are to be discussed at the plenary meeting of the Commission which opens at Torquay next week

PLENARY meetings of the International Electrotechnical Commission are held every three or four year, but none has been held in Great Britain since 1919, when fifty-eight delegates from twenty countries were present. This year it is expected that about 300 delegates, representing twenty-seven countries, will participate in the meeting of the Commission to be held in Torquay from June 22nd to the 30th and in London on July 1st.

The meetings of the Commission (usually known as the I.E.C.) differ fundamentally from those of practically all other "congress" bodies in that whereas congresses are usually associated with a certain amount of publicity and may be attended by any member of the body concerned, the meetings of the I.E.C. take the form of working committees and may be attended only by delegates nominated by the member-countries.

The work of the Commission consists mainly in the preparation of internationally agreed rules and standards intended to facilitate international trade in electrical machinery and apparatus. These internationally agreed recommendations give purchasers an equitable basis for the comparison of tenders, from whatever country they may emanate, safeguard manufacturers from unfair competition, and so promote fair dealings all round.

In addition to drawing up specifications, the I.E.C. is the universally recognised body for the naming of electrical units and the standardisation of symbols. It is also concerning itself with the preparation of an international electrotechnical vocabulary.

If the I.E.C. recommendations are not perhaps so much in the public eye as they well might be, that does not in the least mean that they have no influence commercially. The fact is that these international recommendations are constantly permeating the national rules, where their identity is often submerged. It is not infrequently the case that they provide a standard of reference in cases of controversy, not only internationally but also between the nationals of the same country. It is, moreover, increasingly noticeable that suitable reference is made in the various national rules to the fact that those national decisions are based on I.E.C. recommendations.

About twenty technical advisory committees will be meeting in Torquay, in the Town Hall and municipal offices, and the following notes briefly summarise the scope of the work which is expected to be accomplished.

Advisory Committee No. 1, Electrotechnical Vocabulary, has for many years been preparing an international vocabulary, various sections of which have been drawn up by small panels of experts. It is hoped that the final drafts of the various sections will be approved, thus enabling the first edition to be published this autumn. The definitions will be in English and French, while the terms themselves will be in English, French, German, Italian, Spanish and Esperanto.

Transformer Ratings

Advisory Committee No. 2, Electrical Machinery, deals with rotating machinery and transformers, but only the latter subject will be discussed in Torquay. At a meeting in Paris last year certain proposals were made regarding the basis of rating transformers, the definition of the reference ambient temperature, and the temperature-rise for forced-cooled transformers. In some countries (including Great Britain) it is usual national committees for consideration, and from the replies received it appears that some further discussion will be required before agreement can be reached on the basis of rating transformers. In some countries (including Great Britain) it is usual to rate a transformer in terms of the no-load secondary voltage and the rated secondary current, whereas in other countries (including France) the rating is based on the full-load secondary voltage.

An endeavour will be made at Torquay to agree on a compromise proposal that the rating shall be based on the full-load secondary voltage at a stated power-factor. The various countries appear to have different views as to what this power-factor should be, the proposed values ranging from 0.8 to unity.

Advisory Committee No. 3, Graphical Symbols, will consider proposals for the revision of the existing I.E.C. publication and will consider extending it to include a section on relays.

Advisory Committee No. 5, Steam Turbines, has already caused the issue of a specification (Publication 45) and a test code (Publication 46). Consideration is now being given to the extension of the scope of these documents to cover non-condensing, back-pressure, extraction, mixed-pressure and variable-pressure steam turbines. At the last meeting of the committee (in 1935) it was proposed that the performance of these types of turbines could be expressed in terms of a steam or a heat rate. This proposal has not proved acceptable to some of the national committees, and the British committee, for instance, prefers that the performance should be defined by the total steam consumption against total kWh at each load. The matter will, therefore, require further discussion at Torquay.

Advisory Committee No. 6, Lamp Caps and Holders, has made extensive proposals and it is anticipated that they will be adopted internationally, together with proposals for gauges to define the boundary between lamps and lighting fittings. These gauges are based on certain maximum lamp-forms, which are intended to provide for future developments in lamp design rather than for lamps in use at the present moment, and it therefore appears likely that these gauges, if adopted, will be regarded as objective standards rather than as standards for immediate use.

Resistivity of Aluminium

Advisory Committee No. 7, Aluminium, has for some years been discussing the establishment of an international standard for the resistivity of aluminium as used for overhead conductors. Agreement has been difficult to obtain on account of the fact that, owing to differing methods of production of aluminium conductors in various countries, the properties of the material differ; one universal standard can hardly apply to all countries unless liberal tolerances are allowed. Proposals have been made to obviate the necessity for these wide tolerances by establishing two standards of aluminium. At the meeting in Torquay an endeavour will be made to reach finality in the matter.

Consideration will also be given to the results of tests on galvanised wire that have been carried out in other countries in accordance with a prearranged programme, arising out of which it is hoped that it will be possible to lay down a standard method of testing galvanised wires as used in steel-cored aluminium conductors.

Advisory Committee No. 8, Voltages and Insulators, having accomplished the standardisation of three-phase voltages some years ago, the question of two-phase voltages is now being considered. It is hoped that finality will also be reached regarding the international specification for the testing of line insulators. Progress will be made with the drafting of an international specification for bushing insulators, and further consideration will be given to impulse voltage tests for insulators.

Advisory Committee No. 9, Electric Traction Equipment, will consider the revision of the specification for traction motors (Publication 48), and it is proposed to extend the rules to cover Diesel-electric equipment. The agenda also includes an item relating to transformers and switchgear used on rolling stock.

Advisory Committee No. 11, Overhead Lines, has been largely occupied with keeping up to date a comprehensive summary of the regulations in force in the different countries. In the past this summary has been available as an I.E.C. publication in French only, but it is hoped that arising out of the Torquay meeting a revised edition will be available both in French and in English. Further consideration will also be given to the British proposal for the unification of the assumed loadings and factors of safety in relation to the safety of overhead lines. Some years ago the British Committee submitted the proposal in the form of a formula, the constants in which might vary from country to country according to the meteorological conditions. At the last meeting (1935) there was general agreement in principle, but a decision regarding the values for the constants was deferred until the national committees had given the matter further consideration. It has been the view of the British Committee that unless some such formula is adopted internationally there is no possibility of readily comparing the various regulations.

Advisory Committee No. 12 anticipates that final agreement will be reached regarding the safety rules for mains-operated radio apparatus. An international specification for condensers as used in radio-interference suppressors and radio receivers will also be under consideration.

Advisory Committee No. 13, Measuring Instruments, will discuss the revision of the international specification for meters, indicating instruments, and instrument transformers.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Staff Organisation

I quite agree with "T. R. Selected" and "Power Engineer" that the selection of staff is a matter for the "chief." Perhaps I did not make myself quite clear when I alluded to the matter of a personnel department.

My suggestion is that when a vacancy arises the chief shall communicate with the personnel department, which will send him a list of about a dozen suitable names from which the final selection could be made. This would avoid the cumbersome process of advertising with the resulting deluge of replies, the bulk of which are utterly hopeless anyway.

On the staff side, any man wishing to make a change would enter his name on the books of the personnel department, which would carefully investigate his case and earmark him for advancement if suitable. New blood coming into the industry would be selected and regulated by the same department.

Of course, many men already in jobs that suit them do not wish to make a change. On the other hand, a large number of progressive men feel that they are in backwaters at present and would welcome a chance of some sort such as a personnel department would offer. Many of the larger concerns already operate such a system which—while quite commendable in their own circle—automatically excludes men who are with smaller undertakings possessing only one power station.

With a personnel department an employer would no longer find it necessary to wade through stacks of applications, progressively losing patience as he went along. The few applications he did receive would be set forth in comparable terms so that neither bluff nor understatement would be a factor to be considered. Also the employé would feel that he had some sort of chance at last.

June 10th. ANOTHER POWER ENGINEER.

Letters and Tenders

I agree with the principles set out in the article with this heading published in your issue of June 3rd, but I would like to make one or two suggestions to the people responsible for issuing inquiries.

The time given for tendering should be as long as possible, bearing in mind that the party tendering may have to issue a number of side inquiries, each of which will require time to prepare. Moreover, it is unreasonable to expect that other customers' inquiries should be held over because an individual customer allows a very short tendering time. It seems that operations other than tendering and estimating are acknowledged to take some time, but a tender which may involve the consideration of undesigned plant is often requested "by return," which is impracticable in many cases. Such a stipulation, however, means that the tender is rushed and frequently results in the nearest standard, and not the most suitable scheme or apparatus, being offered. Now the customer can never determine whether he has got the best scheme, because he is not in a position to gauge the resources of the tendering firm, and there has been no time in which to prepare an alternative scheme. Accurate tendering seems to be discounted in favour of "jumped" estimates and designs.

That the time allowed for tendering is often unnecessarily curtailed is illustrated by the number of revisions which so often take place long after the submission of the original tender. There is often a delay in placing orders which is not compatible with the rush tactics demanded by the firm issuing the inquiry. In connection with this latter point later order-placing results in rush deliveries, when prompt placing would allow the manufacturer a more satisfactory delivery time.

Specifications should be prepared by competent engineers versed in modern engineering practice, a requirement which is frequently overlooked. If no such engineer is available it would be preferable for the inquirer to confine himself to a description of the purpose for which the apparatus is required. Alternatively the engineering departments of reputable firms should be allowed to prepare and tender suitable schemes.

When firms acting as main contractors issue inquiries to potential sub-contractors complete details of the ultimate customer's requirements should be given. Failure to observe this often leads to considerable delay. FELIX.

June 8th.

Non-tracking Plastics

We note with interest Mr. Kemp's article on this subject in the current issue of the ELECTRICAL REVIEW, and your editorial comment on page 832. We would like to emphasise that we are deeply interested in these tests on such materials and the following remarks are based merely on our present findings and are not antagonistic, as we anticipate that even these urea mouldings will be further improved and before long be really acceptable for the purposes described.

Some years ago, when bakelite mouldings were coming into use, a great number of exaggerated and quite unofficial claims were made for their properties which, through not being substantiated in use, created a swing of the pendulum, which in turn tended to bring these bakelite mouldings into undeserved disrepute for a time. There seems to be a danger of the same thing occurring in connection with urea mouldings, and with regard to your editorial comment, we must quarrel with your statement that such mouldings have found a wide scope in the manufacture of switches. We do not disagree in so far as it applies to plugs and radio components.

Regarding their use for switches, this suggests, obviously, switch bases, and in this matter, especially for use on ordinary lighting circuits, we say that such a remark is decidedly very

Activities of the I.E.C. (*Concluded from preceding page*)

Advisory Committee No. 15, Shellac, whose chairman is Mr. A. J. Gibson, will present a progress report on the electrical application of lac in the past three years.

Advisory Committee No. 16, Terminal Markings, has for some years been discussing the international standardisation of terminal markings for electrical machinery and apparatus. It has been found, however, that although there is a certain amount of agreement regarding the systems of terminal markings in use in a number of European countries the systems in use in Great Britain and the United States have become so well established that it would not be practicable for them to be modified at present to conform to the systems favoured by the Continental countries. It is proposed, therefore, that the I.E.C. should issue a report (rather than a specification) describing the systems in use, and the final form of this report will be discussed in Torquay.

Advisory Committee No. 17, Switchgear, has caused a specification for a.c. circuit-breakers to be published recently, and the national committees were asked to submit proposals for the extension of the document to cover such matters as the rate-of-rise of re-striking voltage, natural frequency of the test circuit. &c. The British committee has prepared detailed proposals on these matters, and they will be discussed in Torquay, together with corresponding proposals from other countries.

Advisory Committee No. 19, Internal Combustion Engines, will further consider the draft specification and the draft test code for internal combustion engines. In general form these documents correspond to those steam turbines.

Advisory Committee No. 20, Electric Cables, is to deal with the revision of I.E.C. Publication 55 on tests on impregnated paper-insulated lead-covered cables.

Advisory Committee No. 21, Accumulators, is dealing at present with the standardisation of automobile starter batteries. The work is in its early stages, but it is hoped that as a result of the Torquay meeting a draft specification will be completed for circulation to the national committees for comment.

Advisory Committee No. 22, Electronic Devices, at its last meeting formed a sub-committee of experts to draft a specification for rectifiers. The proposals have now become available and will form the main subject of discussion in Torquay. It is hoped that the thorny problems of overloads and ambient temperature will be resolved as a result of the proposals of the experts' sub-committee.

Advisory Committee No. 25, Letter Symbols, will deal with the revision and extension of I.E.C. Publication 27. The last edition was issued in 1920, and it is therefore not surprising that revisions and, more particularly, extensions are now called for.

Advisory Committee No. 26, Electric Welding, is newly formed and will hold its first meeting. The discussion will be mainly concerned with the scope of the work that can usefully be undertaken internationally at the present time. The British committee acts as secretariat, and has put forward definite proposals dealing with the rating of electric welding equipment, and even if these proposals are not adopted *in toto* they will serve as a useful basis for discussion.

previous. Your remark, also, regarding temperature should be noted especially, as switches are often mounted on such articles as radiators and hot plates.

Concerning Mr. Kemp's article, we note that no reference is made to the respective absorption features of phenol and urea mouldings, and this aspect is too important to overlook. Our own tests on urea mouldings for resistance to the detrimental effects of adjacent arcing as distinct from tracking do not confirm the results and conclusions stated, as on a 15-A, 230-V circuit charred surfaces arising from the repeated flash on breaking circuit gave, in several instances, a surface having an unacceptably low reading for insulation resistance, and in one case was down to infinity over a length of one-eight of an inch. For this reason alone, apart from others, we cannot accept the sub-heading in Mr. Kemp's article which states "Problem Solved." Nothing is said regarding the resistance of urea mouldings to various types of plaster, which have a destructive effect on ordinary phenol mouldings.

On the whole, these optimistic conclusions which are expressed may, and probably will, be justified at some date in the near future, but they are too premature to accept at present in respect of electrical accessories, such as tumbler switches, incorporating urea mouldings carrying permanently live metal parts at 230-V pressure. The future utility of these mouldings must not be jeopardised by such over-statements as "Problem Solved." J. H. TUCKER & CO., LTD.

Birmingham, 11, *June 10th.* J. B. TUCKER, *Managing Director.*

Reorganisation of Distribution

I was very surprised to read of the communication you had received from Mr. H. M. Sayers under the heading of "Reorganisation of Distribution" (referred to on page 845) which I think ought to be replied to immediately so far as the Committee of Smaller Municipal Electricity Supply Undertakings is concerned.

As you are aware, the Basis "D" put forward by this organisation was communicated to the Press following a meeting which we held in Manchester as far back as September 15th, 1937, and has been repeatedly referred to in subsequent reports in the Press regarding the activities of this organisation. It was laid before (a) The Minister of Transport by a deputation of the smaller undertakings on October 15th last; (b) a meeting of Members of Parliament in the House of Commons on November 16th which was attended by over 70 members; and (c) the Electricity Commissioners as recently as April 28th last.

The offer of "food safety" thermometers by E.D.A. in connection with its refrigerator campaign has resulted in an avalanche of applications; hence this activity at Savoy Hill

I fail to see in view of this how it can be said that we have not put forward constructive proposals to carry out the objects which appear to be aimed at by the McGowan Committee. I am enclosing herewith a portion of the verbatim report of the meeting held in the House of Commons referred to above which gives our suggested Basis "D," together with the remarks made by Mr. W. P. Lilwall in further elaboration of the plan. The scheme, I may say, is only an outline of our proposals, but I seriously suggest that we cannot fairly be accused of putting forward no constructive proposals. A. J. C. DE RENZI,

Newcastle, Staffs, *June 13th.* *Hon. Secretary,* Committee of Smaller Municipal E.S. Undertakings.

[This matter is referred to in a leaderette.—EDS. ELEC. REV.]

Motors and the Factory Act

I have read the recent letters about the protection of motors, etc., under the new regulations and would like to express through your columns a view from an entirely new angle—the wireman's.

I certainly agree with Mr. Richard's remarks regarding the safety of the modern motor. There must, however, still be thousands of antique motors in operation throughout the country, with the open type of end-bell, which (even in the sizes down to 10 or 7.5 h.p.) you can get your head into, let alone your hand or tool of any description.

As a wireman, I think that what is equally dangerous and certainly more conspicuous is the conduit finishing about 6 in. or 1 ft. (I have seen it more) from the motor terminal box, and the ordinary v.i.r. cables taken into the box in a big loop. This method was not deemed a breach of rules in the days when a wireman's knowledge consisted chiefly of "two wires to a lamp—three to a motor," but in these days of individual drives with their associated switchgear, push-button remote control, etc., it gives even the best of production shops an antiquated air, even though the manufacturers of the particular motors may derive a certain amount of satisfaction from the fact that they are still "revving."

In his memorandum on the Electricity Regulations the Senior Electrical Inspector of Factories, referring to Regulation 2, dealing with the protection of cables, states that "care should be taken that the protection is taken right up to the apparatus, *e.g.*, motors, switches, distribution boards, etc., otherwise parts of the wire are left unprotected at points where they are most liable to damage, and in the case of metal conduit the continuity of the earth connection is broken." I would like to see this rule thoroughly enforced, even if it means scrapping some of the above-mentioned gear, either through lack of space or the inability to convert the existing terminal boxes to conduit entry.

No amount of screening or protection will make a job of this particular failing, and even if the scrapping method had to be resorted to, these motors and other gear must surely have more than paid for themselves. WIREMAN.

June 7th.

Improving Appearances

I was interested to read Mr. Jupe's article in your June 10th issue, especially as I was concerned with the design of the electric iron to which I think he refers. However, although it may be a little ungrateful, I feel that I must take the author to task over some of his criticisms. For instance, I think authorities on industrial design would agree that the majority of modern designs of electric motors are extremely good.

It is perhaps interesting to wonder whether this result has been brought about not by engineers consciously attempting to achieve a satisfactory external appearance, but by reason of the fact that they are compelled to take the maximum advantage of the materials. If the design of a motor successfully meets the engineering conditions imposed, it is automatically æsthetically pleasing. The trouble is that a great number of engineers are unable to distinguish between design which is satisfactory because it is functional and design which is covered by useless ornamentation and "streamlining." I think it is true to say that the majority of American refrigerator designs are excellent, but on the other hand, there are many other articles of American manufacture which are positively revolting in appearance, as a result of mistaken efforts to improve the exterior without due regard to the function of the machine.

On the general question, I am firmly of the opinion that engineers are often unjustly slighted. I know there are many in this country who are only too anxious to produce machines and apparatus which are not only better in technical performance but also have an external appearance in keeping with modern ideas. The trouble, however, is that they are not free agents. When one considers the deadweight of discouragement which they often meet from the commercial and manufacturing people with whom they have to work, it is surprising that the results are as good as they are.

Mr. Jupe might have said a great deal more on the subject of advertising. In my opinion a great deal of the advertising of electrical companies is extremely poor. A very large number of them suffer from the elementary trouble of trying to say or show too much on one page. Many of them do not seem to appreciate that they are telling a story to people who are mentally equipped to know how much truth there is in it.

London, N.W.10, *June 11th.* N. F. SAUNDERS.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

A Fish Cabinet

To its existing large range of electrical apparatus the LIGHTFOOT REFRIGERATION CO., LTD., Abbeydale Road, North Circular Road, Wembley, has recently added a 5 cu. ft. fish cabinet suitable for small fishmongers, restaurants, hotels and clubs. The interior capacity is 10-12 stone of fish, and the ice freezing capacity is 74 large cubes weighing 8 lb. Standard equipment includes three galvanised fish drawers, a wire basket and a shelf suitable for mineral water bottles. Vitreous enamel is the standard finish and the bottom of the cabinet is fitted with a drain plug and outlet pipe. Kapok 2½ in. thick is employed for the insulation. The hermetically sealed unit is guaranteed by the makers for four years.

The Lightfoot fish cabinet

A Lamp Lock

The new "Robrad" lamp lock made by ROBBINS & BRADLEY, LTD., 7-8, Tennant Street, Birmingham, can be used with any type of lampholder, metal or bakelite. Fixing or removing do not damage either the lampholder or the lamp, the device being operated by means of a removable key which tightens or loosens a grub screw just above the shoulder of the lamp.

The "Robrad" lamp lock

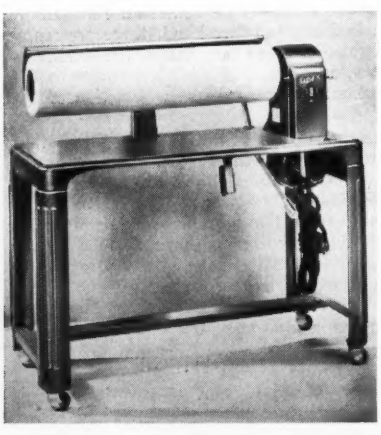
A Speed Reducer

For small powers—up to 2 h.p.—the "2-Three" speed reducers introduced by the KEIGHLEY GEAR CO., Prospect Works, Lockwood Works, Huddersfield, are of simple design and totally enclosed. The worm is made from high carbon steel and the wheel is a solid phosphor-bronze casting, the teeth being formed by the hobbing process. Forged steel is employed for the wheelshaft. The wormshaft is carried on dual-purpose ball bearings, and phosphor-bronze bushes are employed to carry the wheelshaft.

The casing is a close-grained casting, ribbed to ensure rigidity. Splash lubrication is employed for the gear and wormshaft and Stauffer lubricators for the wheelshaft.

An Electric Ironer

APEX-VACTRIC, LTD., Honeypot Lane, Stanmore, has introduced a low-priced electric ironer known as "Model 511." One of the main features is the method in which the motor is mounted, which makes it easy to iron large pieces. The sturdy chassis of welded steel is a very attractive green colour. The ⅓-h.p. motor is rubber-mounted and the roll is 26 in. long and moves to the shoe which is the same length and heavily chromium plated. Ten feet of flex is attached. The floor area required for the machine, which is mounted on large rubber castors, is 15¼ in. by 34⅜ in.



The Apex-Vactric "Model 511" electric ironer

A Cable Connector

A new type of cable connector offering several important advantages has just been introduced by PHILIPS LAMPS, LTD., 145, Charing Cross Road, London, W.C.2. It consists of two parts; a fluted brass sleeve and an outer thimble-shaped cap moulded in black insulating material. A special tool for fixing the connector is supplied without charge.

Screwing up the Philips connector with the special tool

In use the procedure is simple and quick. The insulation on the wires to be connected is stripped back for about ⅝ in. and the bared conductors laid up together. The brass sleeve is slipped over them and screwed up with the tool, resulting in an immovable joint giving electrical connection between all the conductors. Finally, the insulating cap is screwed on over the brass sleeve by hand. Alternatively, the bared conductors can first be twisted together with the other end of the tool, if desired. This twists them up tightly and at the same time makes a light thread on them for the brass sleeve.

The principal advantages of the new connector are that the soundness of the connection in the brass sleeve can be inspected and verified before the insulating cap is put on; as the wires are held by the brass sleeve, the insulating cap is not subjected to any mechanical strain; no part of the live conductors can be left exposed, as the outer cap is about twice the length of the brass sleeve and comes well down over the insulation of the cables; and the connector is equally efficient with anything up to five 3/0.036 as it is with two 1/0.044 cables, the brass sleeve expanding automatically to accommodate them.

A Multi-purpose Floor Machine

Under the Factories Act which comes into force on July 1st it is compulsory to clean by washing or other effective method all workshop floors once weekly, and the appearance of the new "Silent Chief" floor machine thus comes at an opportune moment.

Marketed by SILENT CHIEF (GREAT BRITAIN), LTD., 14, Leicester St., Leicester Square, W.C.2, this machine carries out with equal facility scrubbing (with soap and water), polishing, sandpapering or burnishing of any type of wood, stone or cement floor, as well as shampooing carpets *in situ*. For the last-mentioned use the machine can be supplied with a special vacuum attachment for the speedy removal of the suds. This suction attachment, which is also available as a separate unit, can also be utilised for normal vacuum cleaning duties or for taking up the water and suds after floor scrubbing.

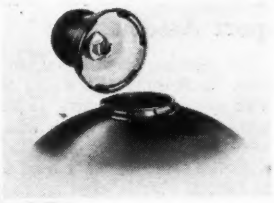
The "Silent Chief" floor machine with and without washing and suction attachments. In the latter form it is intended primarily for shampooing carpets

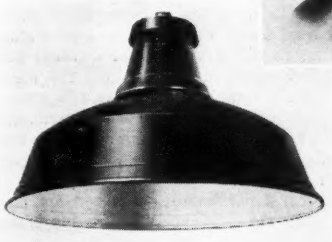
Labour costs are claimed to be reduced by 75 per cent. by the use of the "Silent Chief," the operation of which is extremely simple and requires no muscular effort. Steering is effected by raising or lowering the handle, below which is a safety switch arranged to open immediately the operator's hand is removed. The various attachments are readily fixed to the machine.

A special geared head, ball-bearing motor ensures compactness, silence and efficiency, while speed reduction is achieved by means of helical gears, countershaft and chain drives. The entire weight of the machine rests on the brushes, which are made in 13½, 15 and 18 in. sizes. A year's guarantee is given with all models.

An Overlamp Reflector

The "Croslac" overlamp reflector is a new product of R. & A. G. CROSSLAND, Price Street, Birmingham, the special feature of its design being the absence of fixing screws or other loose components. Definite engagement and ease of removal of the reflector body for cleaning are other advantages. It is also stated to be weatherproof and therefore suitable for outdoor use. Removal is by lifting, turning and then lowering. There are 100, 150, 200, 300 and 500 W models, fitted with shades of 14, 14, 16, 18 and 18 in. diameter, respectively.





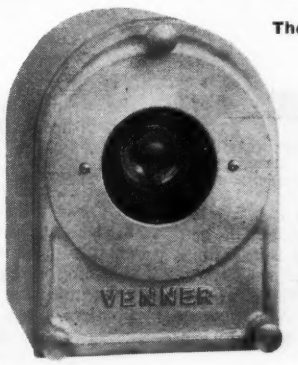
The "Croslac" overlamp reflector showing the method of detachment

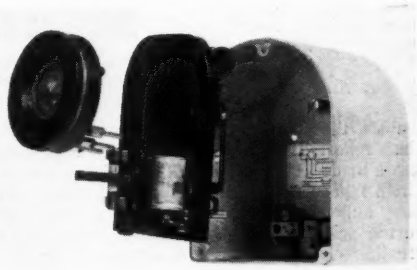
A Light-sensitive Switch

A simple and reliable form of light-sensitive switch depending for its use upon a photo-chemical reaction has been developed recently by VENNER TIME SWITCHES, LTD., Beverley Way, New Malden, Surrey.

There is a small glass bulb containing two electrodes partly filled with a solution of calcium chloride and hydrochloric acid, which, when subjected to electrolysis, liberates free chlorine and hydrogen. These two gases combine if exposed to bright light and re-dissolve into solution. When, however, the light is not sufficiently strong to bring about this chemical composition, the gases create a pressure within the glass bulb causing one side of the bulb, which is in the form of a diaphragm, to bend slightly and thus either operate a switch directly, or, more usually, move a column of mercury which closes the circuit to be controlled. After the switch has closed a high resistance is put in series with the electrodes to prevent further gas pressure being built up.

The cell is assembled in a glass disc about 2 in. in diameter by ½ in. wide and weighing 2 oz. The electrical rating of the switch is 200 W.





The Venner light-sensitive switch; the "exploded" view below shows the various components

A Modern Drying Cabinet

Preheating and superheating chambers are incorporated in the 3½-kW heating unit utilised in the new "Dryad" cabinet, made by DRYING CABINETS, LTD., 25, Victoria Street, S.W.1.

The "Dryad" drying cabinet

The heating unit, which has been specially designed to eliminate radiant heat, is housed in the base of the cabinet, and is controlled by a switch in the bottom panel, a mesh guard protecting clothes from accidental contact with the heater.

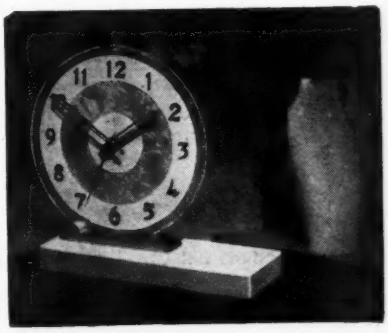
When the heat is switched on a continuous current of fresh air is rapidly brought to the desired temperature and passed into the cabinet where, after circulating through the clothes and absorbing moisture, it escapes through exhaust vents, which are so arranged that the opening of doors or windows will not interfere with the air flow through the cabinet.

Constructed of heavy gauge sheet metal, finished in white cellulose outside and aluminium inside, the cabinet comprises inner and outer shells, with a 1-in. air space which ensures good heat insulation and obviates radiant losses. It measures 6 ft. 1 in. high, 2 ft. 9 in. wide, and 1 ft. 8 in. deep, and occupies 4½ sq. ft. of floor space. The eight racks which are provided accommodate the normal load of a washer or a wash boiler.

Electric Clocks

Newcomers to the manufacture of electric clocks are GRAHAM FARISH, LTD., Bromley Kent, who have recently brought out two attractive synchronous mains models.

No. 573 is finished in crackle glass and moulded bakelite in various shades with gold or silver figures and hands. A second clock (No. 574), more orthodox in style, has a glass dial and chromium plated on satin brass supports on a bakelite base, the figures and hands being either gold or silver. An inset clock movement for building into a tiled surround or direct into the wall is also supplied, complete with a slabbing box, and the movement, which is additionally enclosed in a separate case, is held firmly in position by a strong spring clip.



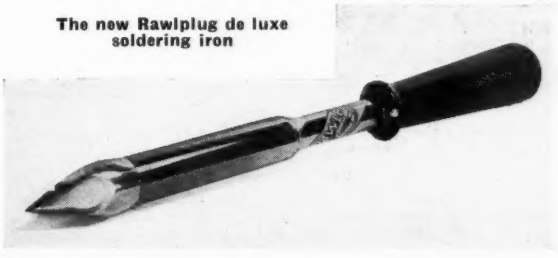
A recently introduced Graham-Farish clock

A Robust Soldering Iron

A *de luxe* model of the Rawlplug soldering iron, designed for long service and heavy duty, and covered by a six months' guarantee, has been brought out by the RAWLPLUG CO., LTD., Cromwell Road, London, S.W.7.

Both the bit and the element are fixtures and cannot be replaced by the user. This form has been incorporated as the makers have found that complaints by users of the earlier model have been generally due to inexpert adjustments. In addition, the chance of this element burning out has been made more remote by increasing the voltage range to 100/110, 200/210, 220/230, and 240/250.

The element is rated at 110 W, and is wound with nichrome wire on two flat-type mica formers, each of which is insulated with mica strips back and front. The elements are clamped to a tongue on the back end of the bit, which is housed inside a tube. The bit is made of 99 per cent. pure forged copper. Normally, a standard pointed bit, weighing 8 oz., with a groove on one side for soldering wires, is provided, but hatchet or pencil kits are available for special work where they are required.



The new Rawlplug de luxe soldering iron

To ensure good contact between the element and the flexible cable, nichrome wire is wound round the element tailing wires which are insulated with porcelain beads.

It takes about ten minutes to reach an average soldering temperature from cold, the maximum temperature being about 325 deg. C., giving sufficient heat reserve for continual use without danger of the element burning out. Six feet of two- or three-core flexible cable is provided, and the equipment is subjected to a 500-V insulation test before despatch.

D

Transport Conference

The Folkestone meeting of the Tramways, Light Railways and Transport Association

THE annual congress of the Tramways, Light Railways and Transport Association was held at Folkestone from June 8th to 10th. In the absence of Sir Arthur Stanley (President) the conference and annual general meeting were presided over by Mr. T. E. Thomas (Chairman of the Council). A departure was made this year from the usual custom inasmuch as instead of the conference proceedings taking place on the mornings of two days, the first day was devoted to a trip to Ramsgate, where the party was entertained to luncheon by the East Kent Road Car Co. and afterwards inspected the company's workshops at Canterbury, and the second day, June 10th, was wholly occupied with the proceedings of the annual general meeting and the conference. The annual dinner was held at the Royal Pavilion Hotel, on June 9th.

At the annual general meeting on June 10th Mr. Thomas reviewed the events of the past year, and after pointing out that the balance sheet showed a credit balance of £215 compared with a small loss in the previous year, dealt with a few of the more outstanding matters. He said that the Government had given effect to the representations of the Association and kindred bodies and all who used tower wagons were now receiving the financial benefit of the lower duty formerly paid.

Mr. T. E. Thomas (London Transport) who presided at the meetings

Referring to electrolytic damage to Post Office cables, the chairman reminded the meeting that last year he had reported that a mutually satisfactory arrangement had been made between the G.P.O. and the Tramway Associations with regard to outstanding claims against a number of tramway undertakings. This agreement, he said, affected all claims made prior to December, 1935. Since that date numerous further claims had been received and negotiations had been proceeding with the representatives of the G.P.O. with regard to proposals for the amendment of the Ministry of Transport's Regulations. A draft code had been prepared and at the present time tests were being conducted on some selected systems.

Vehicle Lighting

The illumination of public service vehicles was also mentioned, and it was pointed out that further progress had been made by a joint committee of representatives of the Association, the Municipal Tramways and Transport Association, the Omnibus Owners' Association and the Society of Motor Manufacturers and Traders. Leyland Motors, Ltd., had supplied a model vehicle for the use of the joint committee at the G.E.C. Research Laboratories, Wembley. Experiments were being carried out with a view to developing the illumination of public service vehicles along scientific lines and so making them more attractive.

The following were elected to the Council:—Mr. B. England (Leicester), Mr. H. Muscroft (Southend-on-Sea), Mr. D. P. Morrison (Bournemouth), Mr. H. Hattersley (Karrier Motors, Ltd.), and Mr. W. Luff (Blackpool).

Following the annual general meeting two papers were read bearing the title "Things that we Want," the authors being Mr. A. A. Liardet, of Leyland Motors, Ltd., who put the manufacturer's point of view, and Mr. G. F. Sinclair, rolling stock engineer (trams and trolley buses), London Passenger Transport Board, who dealt with the subject from the operator's standpoint.

Mr. Liardet's paper dealt mainly with motor buses although many of his points were equally applicable to trolley vehicles. He said that manufacturers called for (1) Standardisation of chassis specification and performance; (2) more unity of opinion on the part of operators as to the lines on which new development should proceed; (3) a revision of taxation of goods vehicles on a more logical basis—the pay load or gross weight; (4) a revision of taxation for passenger vehicles to be based on the exact seating capacity; (5) a reduction of the various legal axle weights to one maximum, with freedom to fix and tyre a satisfactory number of axles for the purpose for which the machine was going to be used; (6) an increased overall width and length for two-axle passenger vehicles to assist in producing vehicles for overseas more economically; (7) a revision of the law governing speeds to give a higher maximum limit.

Mr. Sinclair gave speed, safety and efficiency as his three aims in defining the wants of the operators. Dealing first with speed, and referring to trolley buses, he said that vehicles with higher acceleration which could be operated smoothly were required. In order to maintain a better relationship with the speed of other road traffic the capacity of oil engines or electric motors used on public service vehicles would have to be increased. On trolley buses in this country the use of automatic acceleration had not found favour, although systems were available, the most popular being the electro-pneumatic. The all-electric control of a compound motor gave in some degree this characteristic after the movement of the pedal through the first section of travel.

He advocated a platform enlargement to allow for three passengers to board or alight simultaneously to provide greater facilities both for the conductor and the passengers.

Another requirement specified was high retardation without discomfort to the passengers and with suitable warning to other traffic, whilst other points made were the need for a more liberal response by manufacturers to fundamental changes in design, an improved method of treating steel against corrosion, more robust chassis units to withstand the rough usage experienced in service, the manufacturing industry to take a broader view of standardisation, a reduction in the weight of batteries without loss of life and finally quieter vehicles.

Battery Problems

On the question of batteries, Mr. Sinclair pointed out that the use of a buffer battery in bus and trolley bus work was established. From the mechanical and electrical point of view, the nickel-iron cell was attractive. The charge and discharge rates, being only limited by the temperature of the electrolyte, the cells stood up to complete short circuits, due partly to the fact that the internal resistance of the cell was much higher than that of the lead cell. For the starting of Diesel engines or propelling a trolley bus in emergency, the power output from the battery had to be greater to-day than in the past, and sufficient research had not been carried out on this problem.

The system of series-paralleling of batteries to provide 30-V lighting and 60-V for traction purposes had found ready favour. The normal connections of batteries in parallel for charging under these circumstances, however, had disadvantages. The charging of two batteries in parallel from a constant voltage generator allowed the over-charging of some cells and the under-charging of others, with a resultant increase in battery maintenance through the development of faulty cells. In the case of the trolley bus, the restrictions imposed by regulations prohibited the use of a 60-V system. With the Diesel bus, the 24-V system for lighting and engine starting seemed to offer the best solution.

On the question of noise, criticism was made of the high-pitched note from trolley buses when wheel-type current collectors were used. The substitution of holders fitted with carbon instead of wheels for current collection, it was added, is accompanied by advantages in materials as well as noise.

A plea was made for the chassisless vehicle which, it was claimed, gave all the advantages of ordinary construction, *viz.*, strength, lightness and improved riding qualities. Finally, it was pointed out that there seemed to be a gap which should be bridged between the work of the various research associations and the industry.

The Bus of the Future

In the course of the discussion on these two papers, Mr. K. Adams said the trolley bus was most popular, but it had many defects. Mr. W. Vane Morland (general manager, Leeds City Transport) expressed the view that the vehicle of the future would be a trolley bus with an auxiliary Diesel engine so that the vehicles could be used as trolley buses in the busy centres and ordinary buses in the outlying areas. He complained of the manner in which restrictions on weight and dimensions of buses were preventing the building of vehicles for transport.

Major F. J. Chapple (Bristol Tramways and Carriage Co.) remarked that in Bristol the question of using trolley buses had been gone into very carefully and the decision against them was solely on economic grounds. Where the margin between operating expenses and revenue was a fine one trolley buses were not economical, and in such areas he believed the public would prefer reasonable comfort and speed and moderate fares to luxury and very high speed and high fares.

(*Concluded on page* 885)

He suggested that if modifications were made in the present Ministry of Transport regulations it would be possible again to experiment with vehicles similar to the old Tilling-Stevens petrol-electric buses.

The Case for the Lead Battery

Mr. S. Brown (Chloride Electrical Storage Co.), discussing charging and discharging rates, suggested that the admittedly higher internal resistance of an alkaline battery was a vice rather than a virtue. There was no reason at all why any reputable lead-acid cell should not be discharged at any rate of current within the limitations of the current carrying capacity of the terminals. Moreover, a lead-acid cell could be charged at rates very much in excess of the manufacturer's normal specified charging rate, provided that the high rate was reduced towards the end of the charge; this was not difficult in practice.

He suggested that batteries should be rated on the basis of watt-hours per lb. weight. The discharge rate of an alkaline cell, he said, was limited by its high internal resistance. A further advantage of the lead acid battery in connection with high rates of discharge was that it would give a series of intermittent short-circuiting currents without the necessity for recharging, due to the recuperative effect of the cell consequent upon the diffusion of electrolyte. There was no reason why the charging of two half batteries in parallel from a constant voltage generator should result in odd faulty cells developing. Faults of that nature occurred only where there was a faulty contact on the series parallel switch and, to a lesser extent, where the two halves of the battery happened to be in positions which were subjected to widely different temperatures.

The weight of trolley-bus batteries had been reduced considerably during the past two years. On the other hand, generally speaking, weight and life were linked, and a great reduction in the one might quite well affect the other in a detrimental manner.

Mr. L. E. Harvey, technical investigation officer, London Transport, asked for some modernisation of the trolley boom and trolley base for the trolley-bus which, he said, were practically the same as were used on tramcars 35 years ago. He also urged that something should be done to restrict the side movement and height of the trolley boom to prevent it causing damage if it became dewired.

Mr. S. J. Patmore (General Electric Co., Ltd.) said that the investigations by the committee which was dealing with illumination had shown conclusively that the illumination of public service vehicles averaged about 2½ ft.-candles; it had also been proved by experiment that an illumination intensity of 5 ft.-candles was easily attainable under present restrictions concerning battery weights, generator sizes, &c. The production of a lamp for any particular voltage was a simple matter, but as the voltage increased, the diameter of the wire for any given consumption decreased and, in consequence, the efficiency of the lamp was reduced. If it were desirable that the voltage should be increased, it would be necessary, in order to provide the light intensity required, to provide much bigger generators and much bigger battery capacities.

The Authors' Replies

Mr. Liardet, in the course of his reply, said that for the chassisless vehicle to be a success it would be necessary to depart from the conventional layout of propelling unit, &c., and have the prime mover at the rear.

Mr. Sinclair suggested that it might be well to go slow in the matter of increasing weights and widths of vehicles having regard to the narrow streets which often had to be traversed. Speaking of lead-acid and nickel-iron batteries, he said that notwithstanding the higher price of the latter they were the more economic in those cases where the batteries were not used for considerable periods.

Dealing with the subject of the illumination of vehicles, mentioned by Mr. Patmore, he said that whilst the figure of 5 ft.-candles was often spoken of in connection with public service vehicles, many of the passengers had 1 ft.-candle in their own homes and then thought they were wasting electricity! What was wanted was some form of reflector which would give more ft. candles for the same watts.

Special Purpose Motors

ELECTRIC motors for special purposes compose rather more than a half of the output of the Tuscan Engineering Co., Ltd., and to a large extent have been responsible for the company's recently opening an additional factory at 3, St. Peter's Street, London, N.1.

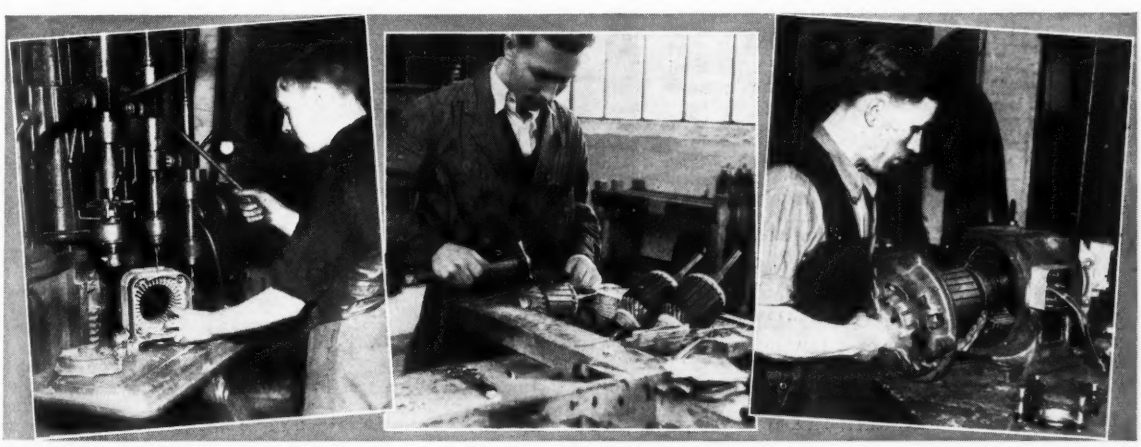
Although the new works, which are approximately double the size of the old factory in Elliott's Place, are intended primarily for the more standard types of apparatus, during a recent visit we noticed in course of manufacture motors for such purposes as sheep shearing, petrol pumps (with built-in switches), fans, compressors, coffee grinders, dough mixers, flexible shafting and grinding machines.

Among the compressor motors a new type of impeller model has been patented in which the air is drawn over the motor to the compressor, and among motor-generator apparatus was a model for providing a three-phase output from a single-phase supply, the output being controlled by adjusting a condenser on the input side. But the really special duty equipment, Mr. J. M. Reekie (one of the directors) told us, is still to be carried out at the old works, together with experimental and research work.

Facilities are provided to make almost any type of motor from ¼- to 7½-h.p., single- or three-phase, a.c. or d.c., for speeds up to 5,000 r.p.m. Large numbers of flameproof motors in sizes from ¼ to 1½ h.p. are produced and a speciality is made of built-in motors, including repulsion induction types.

In designing the factory care has been taken to ensure an even flow of work throughout. Raw materials in the form of castings, stampings, rotor shafts, &c., are issued from extensive storerooms at one end of the building and follow one of two routes. The bodies and end shields pass in sequence along one line of lathes and drills, while the rotor shafts are cut to length and machined, both sets of finished components going then either to assembly or back to stores. All the machines are individually driven and shafting has been minimised.

The winding department on the first floor has been planned so that it can be extended over the whole of the machine shop. A point in manufacture that appealed to us was that even in the smaller machines the rotors are pressed on to the shafts and are then locked up by means of nuts instead of resorting to splines as is common practice. Assembly is carried out on the ground floor, the completed motors then going to a well-equipped test bench before being passed for dispatch.



Various stages in the manufacture of electric motors at the Tuscan Engineering Co.'s works:—Drilling stator packs, finishing off rotor windings, and assembling a 3-h.p. repulsion induction motor designed for a dough-mixing machine *[Elec. Rev. photos.*

Business and Industrial Notes

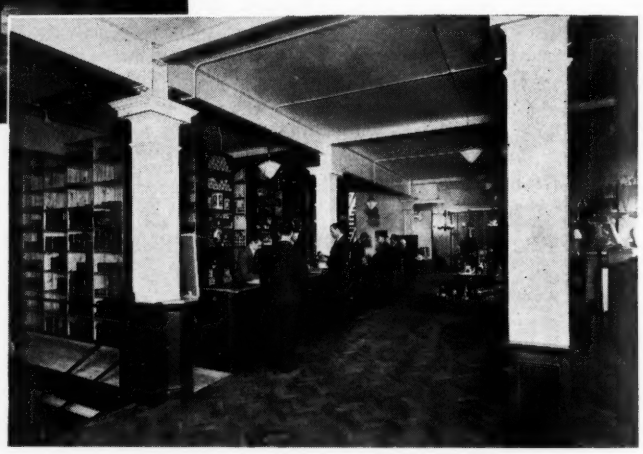
The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Inspection of Electrical Installations

The Department of Health for Scotland has issued a circular to local authorities drawing attention to the result of an inquest into the death of a young man who received an electric shock in a house provided by a local authority. The jury found that there was a lack of care on the part of the electrical contractors with regard to the earthing of the electrical system in the house and the bonding of the tubes, and that the system of supervision adopted by the local authority contributed to the accident and was blameworthy. The jury added a rider that all electrical installations should be fully inspected by a qualified electrician before the electricity is switched on, and the Department points out that if expert inspection of this kind has not already been arranged for by local authorities this should now be done.

New Sino-Japanese Power Company

A *Reuter* message from Tokyo reports that the Japanese Central China Electric Power Industry Union has decided on the establishment of a new joint Sino-Japanese Electric Power Industry Co. The company, it is proposed, shall have a capital of 25,000,000 yen for the development of electric power in Central China. The inaugural meeting of the new concern will be held in Shanghai at the end of June. The head office will be in Shanghai and the board of directors will consist of two Japanese and one Chinese.



Two views of the Electrical and Radio Department at the new West London Branch opened by Brown Bros., Ltd., last week at Acton

Electrical Exhibition at Kingston-on-Thames

In connection with the civic festival which is now being held at Kingston-on-Thames, the Corporation Electricity Department is organising an electrical exhibition at the public library, at which demonstrations are being given of electric cooking and refrigerator "cold cooking," as well as a display of the modern electrical appliances, such as washing machines, water heaters and wash boilers.

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:—

G. Couzens-Howard, Westcliff-on-Sea.
Thomasson & Hartley, Shrewsbury.
David Gamble & Co., Belfast.
Elliott, Madams & Co., Ltd., London, W.1.
A. Robertson, Glasgow.
C. S. Thompson (Letchworth), Ltd., Letchworth.
E. Bilton Smith, Ltd., Acton, W.3.
C. H. Rust, East Finchley, N.2.
South Wales Electric Power Co., Cardiff.
Beds, Cambs and Hunts Electricity Co., Stowmarket.

Australian Electrical News

Our Australian correspondent reports that before leaving for England recently, Mr. R. H. Forbes Mackay, general manager of the Sydney County Council, stated that the increased defence programme in Great Britain had created a danger of insufficient electrical supplies in Sydney, and possibly before long a system of rationing of power would have to be imposed.

Inspections being carried out on Sydney properties in order to ensure that existing electrical fittings and apparatus are safe show that only a very small proportion of installations can be classed as dangerous, and of these the majority require only minor repairs.

Tenders for electrical equipment have been accepted by the Barron Falls Hydro Electricity Board from the Australian General Electric, Ltd. (22-kV transformers, £2,117); Electricity Meter Manufacturing Co. (house service meters, £1,715); together with various quotations for wood poles amounting to £4,759.

A Domestic Water-heating Leaflet

We have received from the Birmingham Corporation Electric Supply Department an attractive leaflet designed for the Department by E.D.A. giving particulars of the facilities afforded for the hire of water-heating apparatus for domestic purposes. A copy of this leaflet has been sent to all consumers with their last quarter's accounts.

Wholesalers' New Branch

To meet growing business in west and the western environs of London Brown Bros., Ltd., have just opened a new branch with a floor area of over 40,000 sq. ft. at 14, The Vale, Acton, under the managership of Mr. D. P. Besley. About a half of the first floor has been allocated to electrical and radio equipment, and in addition to the trade counter there are separate showrooms arranged in the form of large cubicles for the display and demonstration of home laundry equipment, refrigerators, domestic and industrial lighting fittings, and radio apparatus. A model dining room and lounge show the domestic lighting fittings to good advantage in their appropriate settings, and provision is made for rapid change of the units on view. Examples of some of the smaller apparatus such as fires, kettles, irons, toasters, etc., are shown on display stands in the centre.

Demonstrations of colour correction in industrial lighting are given on the second floor, where probably the largest display of garage equipment ever seen in London outside the Motor Show has been arranged.

A daily delivery service will cover a wide area. The excellent artificial lighting installation of the branch was planned by the company's own Lighting Engineering Service, which has recently been responsible for a good deal of similar work throughout the country.

The official opening of the building was performed on June 7th by Lord Kenilworth, president of the Society of Motor Manufacturers, in the presence of a large gathering including the Mayor of Acton, Mr. J. A. Thomson (chairman and managing director of the company) and Mr. Herbert Smith (deputy chairman).

Orders Recently Booked

Britannia Batteries, Ltd., has received an order from Wingrove and Rogers, Ltd., for 117 Britannia alkaline tubular batteries for the propulsion of B.E.V. electric trucks. This is one of the largest orders placed in recent years for steel batteries. They will be manufactured at the company's Redditch works.

Successful plans for lighting the new Aberdeen public baths, submitted by the Edison Swan Electric Co., Ltd., embrace floodlighting, indirect and underwater lighting, together with emergency lighting provided for by "Ediswan" emergency lighting batteries in conjunction with a Tungar battery charger. The electrical contractors are Bell & Robertson.

An Electrical Agricultural Display

A feature of the recent Essex Agricultural Show held at Braintree was a combined display by the County of London Electric Supply Co., Ltd., and the East Anglian Electric Supply Co., Ltd. A large and comprehensive exhibit of agricultural and domestic appliances was shown and the stand was thronged throughout the two days of the show. The attendance at the show was a record for the county.

The display by the County of London Electric Supply Co. and the East Anglian Electric Supply Co. at the Essex Agricultural Show

A Cable Factory Extension

Building operations have been completed in connection with the first half of the extension to the Edison Swan Electric Co.'s cable factory at Lydbrook, Gloucester. As the extension is required particularly to meet the increasing demand for Edison Swan rubber-covered cables, special precautions have been taken to produce conditions best suited for the production of this commodity. The atmosphere in the factory has been rendered independent of outside temperatures and influences by the provision of a roof consisting of an outer covering of "Durasteel" corrugated sheets and an inner lining of "Canec" insulating material, the two roofings being separated from each other by aluminium foil. Special arrangements have also been made for heating and ventilation.

Electrical Propaganda at Plymouth

An interesting display, which attracted a good deal of attention from passers-by, was to be seen recently in the window of the Plymouth Corporation Electricity Department's showroom in Old Town Street. It consisted of two large boxes of runner beans, both planted on the same day, but in one of which Siemens soil-heating cables had been placed. The plants in the heated box were taller, stouter and further developed than those in the unheated box. Lengths of the cable were also shown, together with a thermostat and an electric cooker, flanked by a dish of seeds and another of beans ready for cooking, showing how electricity could be used in connection with them from "seed to table." The display was in the window for a fortnight, including the week during which the Bath and West Show was held in the city, and seemed to be of special interest to visitors present in connection with that event.

Electric Furnace Demonstrations

To provide additional accommodation for demonstrating their products Wild-Barfield Electric Furnaces, Ltd., have just opened premises adjoining their works in North Road, Holloway, where a wide range of standard types of heat-treatment furnaces has been installed. The upper portion of the premises is reserved for a new research department which is nearing completion.

Social Events

Despite inclement weather, there was an attendance of about 2,500 at the annual sports of A. Reyrolle & Co., Ltd., on June 11th. Mrs. Harriman, wife of Mr. W. A. Harriman, works manager, presented the prizes. In the relay race Reyrolle's sales department was first, the drawing office second and the Bushing Co. third. In the inter-works apprentices relay race the result was: 1, Reyrolle; 2, Vickers-Armstrong; 3, Parsons & Co. The Bushing Co. won the tug-of-war.

On June 4th, 575 employés and friends of the English Electric Co., Ltd., Stafford, visited the Empire Exhibition, Glasgow. In spite of adverse weather conditions the visit was enjoyable and instructive. The English Electric Co.'s stand in the Palace of Engineering was naturally of special interest to the members.

A golf match was played at the Wortley Golf Club on June 8th between the Sheffield Electrical Club and the Leeds Electrical Club. The match resulted in a victory for the Sheffield Club by twelve events to none. The members constituting the Sheffield team were: Messrs. C. Law (captain), H. Riley, T. E. Duke, A. J. Cheyne, E. G. R. Taylor, H. Foster, C. A. Russell and H. B. Scaife. The Leeds Club was represented by Messrs. S. T. Needham (captain), C. M. Till, H. Peters, A. MacKinnon, E. J. Fearnside, S. Hammersley, S. J. Rockliffe and G. Edgeley.

Trade Announcement

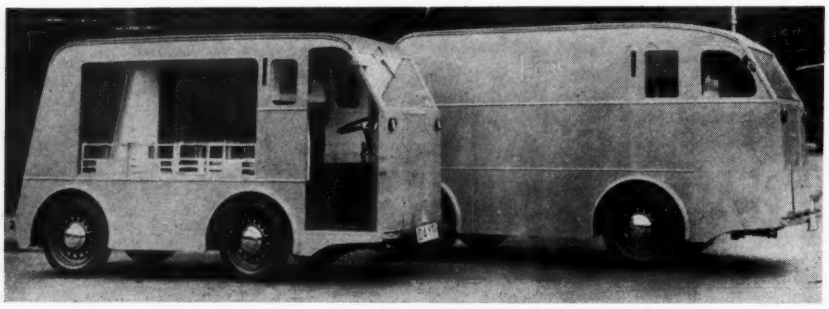
Hoover House, Harcourt Street, Dublin, formerly the Municipal Art Gallery, was opened on May 25th by Ald. A. Byrne, Lord Mayor of Dublin, as the headquarters of Hoover, Ltd., for Eire and Ulster.

Electrical Development in Russia

The estimates for the development of national economy of the U.S.S.R. in 1938 have been elaborated on the basis of the achievements under the first and second plans. According to the *Monthly Review* issued by the U.S.S.R. Trade Delegation in the United Kingdom, capital construction work is to be increased in 1938 by 36 per cent. over the preceding year. The capital investment in heavy industry and in machine construction is to be increased by approximately 50 per cent. The capacity of the power stations controlled by the People's Commissariat for Heavy Industry is to be increased in the current year by more than 800,000 kW, while in the past year the increase was by 224,000 kW. Particular attention will be paid to the increase of electric power output in Moscow, the Urals, the Donetz Basin and Leningrad. In the metallurgical industry six blast furnaces, eleven open-hearth furnaces and a number of Bessemer convertors in Krivoy Rog, and six rolling and tube plants are to be started. The construction of new metallurgical works will be started in the east. In the non-ferrous metal industry three copper smelting plants are to be opened. These are situated in Balkhash, in the Central Urals and in Blyavinsk. Two nickel combines are to be started this year, and many other large enterprises in the non-ferrous metal industry, among them the Ural Aluminium Works and the Tikhvin Alum Works. Serious attention is also being directed in the current year towards the development of the production of electrical machinery. In addition to the extension of the existing turbine plants, the reconstruction work on the Ural turbine plant is being speeded up and a number of factories have started to manufacture small turbines. The machine-building industry of the U.S.S.R. has fulfilled the second Five-

Members of the English Electric (Stafford Works) Engineering Society en route to the Empire Exhibition, Glasgow

Year Plan before the scheduled time. In the past year the gross production of machinery increased by 10.9 per cent., while labour productivity rose by 5.9 per cent. A number of machines and machine parts of new design were manufactured for the first time in 1937, including various types of electrical equipment.



[Elec. Rev. photo.

New types of Cleco electric vehicles for dairy and bakers' delivery use *(Elec. Rev. photo.*

Radio Parts by Air

A recent traffic census carried out by Imperial Airways reveals the remarkable extent to which air transport is used in the radio industry. Practically every working day throughout the year a consignment of radio valves is taken by air from Croydon to Paris. Several times a month radio sets as well are carried, and air transport also proves ideal for photocells and other delicate apparatus. The General Electric Co.'s Paris branch used formerly to carry large stocks to ensure against running short of supplies. While heavy batteries and accumulators still go by steamer, the G.E.C. now uses air transport for well over 50 per cent. of its consignments to Paris.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price June 15th.	Fortnight's Inc. or dec.
a Acid Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£22 10s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a ,, Roll... ... ... ,,	£11	—
a Soda, Chlorate ... ... per lb	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. net.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ,,	1/3 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£154	—
Grade II ... ... ,,	£112	—
Grade III... ... ... ,,	£67	—
c Brass (rolled metal 2″ to 12″ basis)... per lb.	7⅛d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	10¾d. to 11d.	—
c ,, Wire, basis ... ... ,,	7⅛d.	¼d inc.
c Copper Tubes (solid drawn) ... ,,	11¼d.	—
g ,, Bars (best selected)... ... per ton	£70	£2 inc.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£39 10s.	15s. inc.
d ,, ,, Wire Rods ... ,,	£44	15s. inc.
d ,, ,, H.C. Wire ... per lb.	7 1/16d.	1/16d. inc.
f Ebonite Rod ½″ dia. & up ... ... ,,	1/10 to 2/5	—
f ,, Sheet ⅛″ thick & up ... ,,	1/5 to 1/10	—
n German Silver Wire, Nos 1 to 12... ,,	2/4	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	6d.	½d. inc.
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s.	—
i ,, Wire galv. No. 1 P.O. Qual.... ,,	£23	—
g Lead, English Pig ... ... ,,	£15 5s.	10s. dec.
g Mercury ... ... per bot.	£13 10s.	—
e Mica (in original cases) small ... per lb.	10d. to 2/-	—
e ,, ,, ,, medium ... ,,	6/- to 12/6	—
e ,, ,, ,, large ... ,,	13/- to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/2½	—
p ,, ,, drawn bars & rods ,,	1/0½	½d. inc.
p ,, ,, rolled strip & sheet ,,	10½d.	½d. inc.
p ,, ,, wire ... ... ,,	1/0½d.	½d. inc.
o Platinum ... ... per oz.	£6 12s. 6d.	—
d Silicium Bronze Wire ... ... per lb.	8 1/16d.	1/16d. inc.
g Spelter ... ... per ton	£12 7s. 6d.	—
g Tin, Block (English)... ... ... per ton	£170	£5 15s. inc.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/6	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co. ,Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

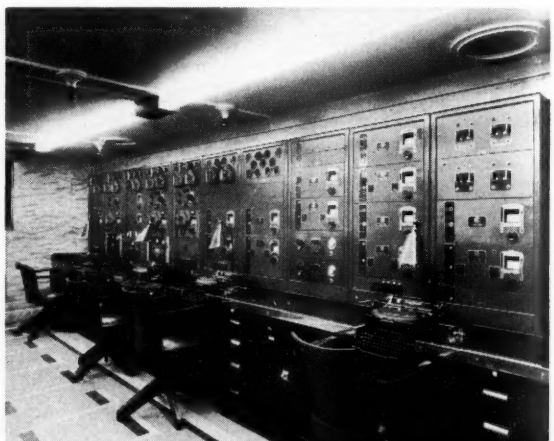
The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

Electric Delivery Vans

Two of the latest types of electric delivery vans made by Cleco Electric Industries, Ltd., Leicester, paid a visit to our offices last week. Both are of attractive modern design finished in Cambridge blue, one (a one-ton model) being fitted out as a baker's van and the other (10 cwt.) has a milk delivery body. The all-welded construction of the bodywork minimises vibration. A range of about forty-five miles per charge at an average speed of 15-18 m.p.h. is obtained with the 60-V battery provided. The controller, which is under the seat just in front of the motor, incorporates mercury switches for placing the resistances in and out of circuit, an arrangement which is claimed to be much more reliable than the more usual method of employing contactors. Three speeds are normally provided, but a special hand control can be brought into operation for manœuvring in confined spaces.

Fluorescent Lighting in the "Queen Mary"

The lighting of the wireless reception room in the Cunard-White Star liner *Queen Mary* has been carried out with "Osira" fluorescent tubing. Before this system was adopted as a permanent installation exhaustive tests were carried out. The room relies on artificial lighting. Formerly this was obtained from nine totally enclosed white opal spherical fittings, each 6 in. in diameter and containing one 60-W daylight blue lamp. The quality of light, combined with the heat dissipation, made working conditions almost unbearable. The average intensity was 2 ft.-candles. The object of the tests was threefold. It was desired to increase the intensity and to provide illumination approximating in quality to natural sunlight. It was also imperative, of course, to detect whether any interference was likely to be experienced with the reception of wireless signals over wavelengths in the marine wave bands extending between 17 metres and 18,000 metres. It was found that fluorescent tubing provided the ideal form of illumination to meet these requirements, and the outcome is that 34 ft. of triple tubing have been fixed direct to the ceiling as a permanent installation. No interference with wireless has been detected. The quality of light is a pleasing approximation to sunlight and has eased considerably the exacting conditions under which the wireless operators have to work. An average intensity of 12 ft.-candles is obtained with a very even distribution on the working plane. The total consumption is about 600 W. The tubing is operated from four transformers which are concealed under a bench in a corner of the room.



A section of the wireless room in the "Queen Mary" illuminated with "Osira" fluorescent tubing

New Catalogues and Lists

Davenport Engineering Co., Ltd., Harris Street, Bradford.—A booklet illustrating water cooling towers which the company has recently constructed.

Electric Art Shades (1928), Ltd., Feering Factory, Kelvedon, Essex.—A pamphlet dealing with an electric clock table lamp.

British Insulated Cables, Ltd., Prescot.—Leaflets describing tramway and trolley-bus line fittings and current collectors.

Horstmann Gear Co., Ltd., Albion Works, Bath.—A complete illustrated catalogue of time switches including sectional drawings and technical data.

Gent & Co., Ltd., Faraday Works, Leicester.—Two catalogues dealing with watchmen's tell-tale clocks and fire alarm equipment.

Tecalemit, Ltd., Great West Road, Brentford.—A 55-page illustrated catalogue of lubrication equipment.

Waite & Son, Ltd., Menin Works, Bond Road, Mitcham.—A comprehensive well-illustrated 52-page art catalogue of lighting fittings. Many of the fittings are shown in colour.

Receiver Appointed

Maxim Lamps, Ltd.—L. V. Smith, chartered accountant, of 25-27, Oxford Street, W.1, was appointed receiver and manager on May 26th, 1938, under powers contained in debenture dated April 29th, 1938.

Private Arrangements

C. D. Williams, 73, Grove Road, King's Heath, Birmingham, motor and electrical engineer and contractor.—At a recent meeting of creditors it was reported that the liabilities amounted to £1,886. The net assets were £953, leaving a deficiency of £934. Recently creditors levied execution and debtor then consulted his solicitors. A deed of assignment was executed in favour of Mr. W. L. Hand, of Corfield and Cripwell, Birmingham, on June 3rd. The representatives of the guarantors of the bank stated that they were prepared to pay off the bank, and not rank for dividend, providing the execution creditors withdrew from possession. It was resolved that subject to the execution creditors withdrawing and the bank's claim being disposed of, the deed of assignment should be confirmed. A committee of inspection was also appointed consisting of the representatives of the General Electric Co., Ltd., Callender's Cable and Construction Co., Ltd., and Mr. F. E. Bendall, of Poppleton and Appleby.

D. G. Israel and **C. H. Tucker,** trading as Splott Radio and Gramophone Co., 9, Splott Road, Cardiff, as Gainsborough Radio & Electrical Engineers, Royal Buildings, Penarth, and as Llandaff Radio & Supplies Co., 3, Station Road, Llandaff North, Cardiff, radio dealers.—A meeting of the creditors was held recently at the offices of Poppleton & Appleby, 35, Windsor Place, Cardiff, when the joint statement of affairs disclosed liabilities of £2,828. The net assets were £766 19s. 4d., leaving a deficiency of £2,061. The separate estate of D. G. Israel showed liabilities of £82, with fully secured creditors of £434 and net assets of £74, leaving a deficiency of £8, while the separate estate of C. H. Tucker disclosed liabilities of £66, with a deficiency of the same amount. It was decided that a deed of assignment should be executed to Mr. L. S. Findlay, C.A., of Poppleton & Appleby. A committee was also appointed consisting of the representatives of Ensign, Ltd., Jiffy Southern, Ltd., and one of the cash creditors.

R. Fogelman, trading as Blackfriars Radio, 80, Walworth Road, London, S.E., and branches.—A meeting of the creditors was held recently at the Incorporated Accountants' Hall, Victoria Embankment, London, W.C. The statement of affairs showed ranking liabilities of £1,438. The net assets were £252, leaving a deficiency of £1,186. After discussing the position it was decided that a committee should be appointed with the object, if possible, of obtaining a secured offer. The committee consisted of the representatives of the Radio Trading Co., Ltd., Streamline Radio, and E. K. Cole, Ltd.

Bankruptcy Proceedings

A. T. White, carrying on business at Radio House, High Street, Hadlow, Kent, electrical engineer.—The adjourned public examination was held recently at the Town Hall, Tunbridge Wells. According to the statement of affairs returned there were ranking liabilities of £798 and net assets of £345, leaving a deficiency of £453. Debtor said his failure was due to lack of capital and slump in trade caused by local depression. The examination was formally adjourned for closing.

C. G. Merrison, radio dealer, 61B, Raleigh Street, Walsall.—Receiving order made June 1st on debtor's own petition.

M. Healey, radio dealer, 51, Broomhill Road, Bulwell, Nottingham.—Last day for receiving proofs for dividend June 25th. Trustee, Mr. A. J. Rogers, 22, Regent Street, Park Row, Nottingham, Official Receiver.

W. R. Paddon, radio dealer, Sea View Terrace, St. Ives, lately trading at Chapel Street, St. Ives.—First and final dividend of 1s. 5¾d. in the £, payable at 12, Princes Street, Truro.

Company Liquidations

Waterloo Tool Co., Ltd., 21/23, York Road, Lambeth, London, S.E.1, electrical and mechanical engineers.—A meeting of creditors was held recently at the offices of Percy Mason & Co., 14, Moorgate, London, E.C., when Mr. Lippold, a director of the company, occupied the chair. The statement of affairs disclosed liabilities of £1,353. The net assets were £753, leaving a deficiency, so far as the creditors were concerned, of £600. The issued capital of the company was £1,280, and as regarded the shareholders there was a deficiency of £1,880, which was mainly attributed to losses on the trading and the depreciation written off the assets in the statement of affairs. The shareholders had previously met and passed the necessary resolution placing the company in voluntary liquidation, and Mr. L. C. Webber, of Percy Mason & Co., had been nominated to act as liquidator. The creditors decided to confirm Mr. Webber's appointment as liquidator, and a committee was also elected.

G. W. Cross & Co., Ltd., electrical engineers, 95, Petty France, London, S.W.1.—At the statutory meeting of creditors the statement of affairs showed liabilities of £2,866. The net assets were £617, leaving a deficiency, so far as the creditors were concerned, of £2,249. The issued capital of the company was £822, and as regarded the shareholders there was a deficiency of £3,071. The shareholders, it was stated, had passed the usual resolution for the voluntary liquidation of the company. The present position was attributed to losses on contracts. The directors were shown in the statement as creditors for substantial amounts, and it was understood that certain of their claims would be waived. Resolutions were passed confirming the voluntary liquidation of the company with the liquidator nominated by the shareholders. A committee was also appointed consisting of the representatives of Walsall Conduits, Ltd., Stearn Electric Co., Ltd., and W. L. Turner & Co.

Electricity Supply

Lighting, Domestic, Power

Bangor.—COOKING IN COUNCIL HOUSES.—Tenants of the Maes Geirchen estates are to be asked by the Gas and Electricity Committee for their views with regard to the use of gas or electricity for cooking. A complete memorandum will then be prepared by the treasurer and engineer showing the capital expenditure involved in extending the gas mains and providing an estimate of the revenue from gas and the cost of giving the supply, together with a comparison of the cost of maintenance of the gas and electric cookers.

Belgian Congo.—POWER SUPPLY PROGRESS.—The Société Générale des Forces Hydro-electriques du Katanga reports that the sales of electricity during last year amounted to 146 million kWh, as compared with 142.6 million kWh in 1936. To meet the increasing requirements of the Union Minière du Haut Katanga two new 13,200-kVA turbo-alternators are to be installed at the Cornet Falls generating station. The capacity of the Jadotville sub-station of the Société Générale Africaine d'Electricité is to be doubled, raising it to 40,000 kVA.

Burton-on-Trent.—EXTENSIONS.—New feeders are to be laid by the Electricity Committee in Branston Road and Leicester Street at a cost of £2,500.

Cardiff.—EXPERIMENTAL LIGHTING.—An offer of the Wardle Engineering Co., Ltd., to install certain types of sodium lighting fittings in Dumfries Place for experimental purposes has been accepted by the Works Committee, subject to the lamps being installed to the satisfaction of the city engineer and to the cost being borne by the company.

Cheltenham.—INDUSTRIAL SUPPLIES.—To meet further applications for supplies to factories and other large premises the Electricity Committee is to spend £864 on providing additional transformers and switchgear at three sub-stations.

Dumfries.—STREET LIGHTING.—The Town Council, after considering the installation of sodium electric-discharge lamps, has decided to use ordinary filament lamps for its new street lighting schemes at Buccleuch Street, Laurieknowe and Cassalands.

Dundee.—TENDERS FOR POWER STATION EXTENSION.—The C.E.B. has offered to help the Electricity Committee in negotiations over the £500,000 extension scheme at Carolina Port generating station. Recently Treasurer Caldwell alleged that a "ring" was operating among generating plant suppliers to keep up prices, and it was decided to submit the tenders for the Board's observations. The Board replied that, from information recently received regarding prices for similar plant, it appeared that the prices quoted were high. The Board considered that the best procedure would be for the Corporation to approach the lowest tenderers and endeavour to get them to justify their prices, and stated that its chief engineer would assist in any negotiations.

Finland.—ELECTRIC COOKING.—The first private electric cooking installation in Helsingfors was introduced in 1932 and comprised a block of twenty-six apartments, all of which were fitted with electric kitchens. The second installation, comprising nineteen kitchens, was completed in 1935. By the end of 1936 the number of electric kitchens had risen to 313. With the introduction of special low charges for electricity for cooking there was a much larger development in 1937, at the end of which there were 964 installations. So far this year about 350 installations have been ordered. In the country as a whole there were about 5,500 electric kitchens at the commencement of the present year.

France.—ELECTRICITY AND INDUSTRY.—The Federation of Users of Electric Current has suggested to the Minister of Commerce that in view of the desirability under present circumstances of utilising the country's hydro-electric power resources to the full, it is necessary that all power in industry should be electric, and that this end should be achieved by suitable reductions in the rates paid for electricity by industry on the one hand and by taxes on fuels and steam engines on the other. Though electrical circles admit that total electrification of industry is their aim, they doubt whether the system proposed would work satisfactorily.

IMPROVEMENT IN PARIS.—Satisfactory progress is shown in the report for 1937 of the Compagnie Parisienne de Distribution d'Electricité. The number of consumers increased from 1,077,992 in 1936 to 1,113,400 last year, and the connected load from 1,422,000 kW to 1,486,000 kW. Energy consumption improved to a somewhat greater extent than before, rising from 779.5 million kWh in 1936 to 850.1 million kWh last year. Increased costs, however, resulted in a drop in profits, and the company is apprehensive of the effects of the increase in the municipal tax on sales from 10 to 20 per cent. of the gross receipts.

Gainsborough.—STREET LIGHTING SCHEME.—The Council has recently been considering improvements in the street lighting and has decided to re-light the whole of the main roads through the town and three or four streets in the centre of the town in accordance with the recommendations of the Departmental Committee on Street Lighting. All public lighting in Gainsborough is at present carried out by the gas undertaking, but the Council has now decided that the whole of the main roads through the town shall be electrically lighted. Mr. H. Breckell, the electrical engineer and manager, anticipates that when the scheme has been completed there will be approximately 130 sodium lamps.

Glasgow.—LIGHTING INSTALLATIONS.—The Parks Committee has approved of a proposal to install electric lighting in the Tollcross and King's Park museums at a cost of £572.

SCHOOL INSTALLATION.—The Education Committee has agreed that the electrical work at the Hamiltonhill (New) School shall be carried out by the Electricity Department at a cost of £1,400.

Grimsby.—SUPPLY FOR STENIGOT.—The Electricity Committee is to supply electricity to Stenigot, which is at present six miles from the nearest cables.

Hastings.—SUPPLY IMPROVEMENTS.—The supply to Cadborough Cliff and Rye is to be improved at a cost of £1,341.

NEW EQUIPMENT.—Out of surplus revenue the Electricity Committee is to purchase cookers, water heaters, &c., costing £9,500, for hire to consumers, and electricity meters costing £7,000.

Hayes and Harlington.—BATH ROAD LIGHTING.—A mile-long section of the Bath road just west of Cranford Bridge has been provided with a sodium lighting installation, this system being chosen after the Council had inspected the demonstration road of the Engineering & Lighting Equipment Co., Ltd., in St. Albans. The scheme comprises forty-four concrete columns equipped with the company's "Golden Ray" refractor plate fittings and 150-W Philips "Philora" sodium lamps, each controlled by a time switch. The average spacing is 132 ft., the mounting height 25 ft. to the light source and bracket projection 5 ft. The installation was planned and carried out by the Engineering and Lighting Equipment Co., Ltd., in conjunction with the Egham and Staines Electricity Co., Ltd.

Isle of Man.—ELECTRICITY REGULATIONS.—The Government authorities have adopted electricity supply regulations designed to ensure public safety and a proper and sufficient supply. In the Tynwald Mr. Alfred Teare urged that the regulations should prevent electrical work being done by incompetent or inexperienced men. Mr. Corrin, chairman of the Electricity Board, said that the Board would welcome such a scheme, if it could be made workable.

"Neophan" lighting fittings in the china and glass department of the Oxford Street, W., store of John Lewis & Co.

Japan.—ELECTRIC POWER PLANT CAPACITY.—According to a report recently issued by the Electric Bureau of the Japanese Department of Commerce the capacity of the electric power stations in Japan at the end of 1937 amounted to 7,070,347 kW, an increase of 330,105 kW during the year. Of the total, plant to the extent of 3,928,292 kW was hydro-electric.

Keswick (Cumberland).—NEGOTIATIONS WITH SUPPLY CO.—Negotiations are proceeding between the Urban District Council and the Keswick Electric Light Co. regarding the proposed extension of the company's lease for five years from 1940.

Laurencekirk (Kincardineshire).—ELECTRIC STREET LIGHTING?—The Lighting Committee is considering a change-over from gas to electricity for street lighting.

Leicester.—POWER STATION EXTENSIONS.—The central generating station at Leicester is to be extended at a cost of £20,000.

London.—FULHAM.—In March, 1937, the Electricity and Lighting Committee reported that it proposed to invite tenders for the construction of one, or alternatively two, additional steam colliers, and the Council approved the proposal. It was however, subsequently found that the time was not opportune for the purchase of any additional boats. The increased load on the power station has now made it imperative to implement the proposal, and the Committee recommends that, subject to the approval of the Central Electricity Board and to the requisite loan being sanctioned by the Electricity Commissioners, the tender of the Burntisland Shipbuilding Co., Ltd., for the construction of two steam colliers for the power station at a cost of £105,400 shall be accepted. The time required for delivery is eight months. At present the Council owns three colliers.

WEST END STORE LIGHTING.—The recently introduced "Neophan" type lighting units of Crompton Parkinson, Ltd., have been installed in the china and glass department of the Oxford Street store of John Lewis & Co., Ltd. An extremely pleasing effect is produced throughout this department, enabling the colourful articles of glass and china to be displayed to the best advantage. This is attributable to the fact that by the introduction of "Neodyim Oxide" into the glass of which these fittings are made, the excess of yellow which is responsible for the colour-hardening effect of artificial light is considerably reduced, and other colours are brought out to better advantage. It is consequently easy to appreciate the value of such fittings as a sales aid. The units in this installation are 12-in. "Chelmsford" spheres utilising 150-W lamps.

Luton.—LOANS.—Application is to be made for sanction to borrow £4,056 for the extension of the transmission system at Dunstable and Edlesborough.

Maidenhead.—MAINS.—Application is to be made by the Town Council for sanction to a loan for the extension of the 6,600-V main to the Maidenhead Industrial Estate, and for a site for a sub-station.

Otley.—REMOVAL OF GAS COOKERS.—The Housing Committee has agreed that gas cookers shall be removed when tenants desire to replace them with electric cookers and make suitable application to the Council.

Port Erin (Isle of Man).—PLACING LINES UNDERGROUND.—The Commissioners have decided to ask Mr. V. A. Bellamy, engineer and secretary of the Isle of Man Electricity Board, to prepare a scheme giving the cost of placing underground the remaining overhead supply lines in Port Erin.

Scarborough.—EXTENSION.—The Town Council is to supply electricity to a number of houses in Brook Street.

South Africa.—JOHANNESBURG'S FOUR-YEAR PLAN.—Within the next four years the Johannesburg Corporation expects to spend more than £7,397,000 on various electricity schemes. Of this amount, £2,005,000 is for a large new power station at Orlando, where work on the foundations has already begun. Extensions to the distribution system will cost at least £1,000,000. The balance represents ordinary expenditure on supply. To counteract a threatened shortage of engineers, the Corporation proposes that the grade of temporary positions now open shall be raised from £40-£45 to £45-50 a month, and that salaries of specified staff officials shall be increased by special allowances of from £2 10s. to £5 monthly.

Stockton-on-Tees.—CABLES.—Cables are to be laid by the Electricity Department in Mill Street and Summerhouse Square in connection with its assisted wiring scheme.

Stoke-on-Trent.—NEW EQUIPMENT.—Transformer equipment and switchgear are to be extended at a cost of £4,200 in connection with the increase in the bulk supply to Stone.

MAINS.—The Electricity Committee is to extend its mains at a cost of £750 to supply 124 houses to be erected on the Bradwell Hall Farm estate, Wolstanton. A supply of electricity is also to be given to 600 houses to be erected for the Corporation at Newhouse Farm, Bucknall, at a cost of £5,650.

Stowmarket.—ELECTRICITY FOR PUMPING.—The Urban District Council has accepted the tariff of the East Anglian Electric Supply Co., Ltd., for a supply of electricity to the Combs waterworks pumping station. Two float switches and equipment are to be installed to control the pump automatically.

Sweden.—INCREASE OF CONSUMPTION.—According to preliminary estimates by the Board of Trade the consumption of electrical energy last year exceeded 8,000 million kWh. The total sales have risen rapidly during the past few years, having almost doubled since 1929. Railway electrification is judged by the Press to be the major cause of the increase of consumption, but our Stockholm correspondent is informed that industrial expansion is the chief reason and that, from the point of view of revenue, the most important factor is domestic consumption.

UNIFORM CHARGES.—At the recent annual meeting of representatives of Swedish electrical utility companies it was decided to adopt a national system of uniform charges for electric power and lighting. The new arrangement comprises three basic scales, the principal feature of which is that rates are lowered from group to group in accordance with the volume of consumption.

Switzerland.—NEW HYDRO-ELECTRIC STATION.—A hydro-electric power station recently put into service at Altendorf utilises the water of the River Sihl, the available head being 1,475 ft. The equipment at present comprises six sets of vertical turbines and alternators each developing 20,000 h.p.

Torquay.—INCREASED CHARGES.—Owing to the higher cost of generation the Electricity Department's tariff for electricity consumed, and the standing charge, are to be increased by 12½ per cent., as from the quarter commencing with July. Up to and including 1934 the undertaking was making a profit, but a profit of £23,000 one year was transformed into a loss of £2,209 the following year as a result of reducing the "unit" charge from ¾d. to ½d. The loss on the undertaking last year was about £23,000, subject to adjustment of grid prices. The cost of coal in 1934-35 was £25,242, and last year it had risen to £41,980, while labour charges had risen from about £22,000 to £35,000.

Sodium lighting along a section of the Bath road (see "Hayes and Harlington" note on facing page)

Uttoxeter.—ELECTRICITY CHEAPER.—Considerable reductions are to be made in the charges for electricity, the new tariffs being as follows:—Rural area: lighting, 6d. per kWh up to 120 kWh, 5½d. for the next 120 kWh, and 5d. for all in excess of 240 kWh; domestic, ¾d. per kWh, and where cookers are installed, ½d. per kWh, with a rateable value charge of 6½ per cent. up to £50 and 2½ per cent. over £50. Urban area: lighting, 5d. per kWh up to the first 120 kWh, 4½d. per kWh for the next 120 kWh, and 4d. per kWh for all over 240 kWh; domestic, ½d. per kWh, with a rateable value charge of 5 per cent. up to £40 and 2½ per cent. over £40; shops, 6s. 6d. per 100 W plus ¾d. per kWh. Farms: where a cooker is installed, ¾d. per kWh, to include power and sterilisers. Slot meters: extra discount of 1d. in the shilling.

West Hartlepool.—SUPPLY EXTENSION.—In connection with a proposed supply to a new aerodrome, £1,500 is to be spent on a line from the North-Eastern Electric Supply Co.'s substation at Greatham.

Wolverhampton.—EXTENSION.—The Electricity Committee is to provide a supply to the Marsh Lane estate, Oxley, at a cost of £4,286.

STREET LIGHTING.—A sum of £1,645 is to be spent on installing street lighting on housing estates.

Woodhall Spa (Lincs).—STREET LIGHTING.—The Urban District Council has accepted the tender of the Mid-Lincolnshire Electric Supply Company for street lighting for three years at £270 a year.

Workington.—SUPPLY TO WORKS.—The electrical engineer and the borough treasurer are to settle the terms of the agreement for the supply of electricity to the Solway Brass Works.

Communications

India.—RADIO INQUIRY.—Our Bombay correspondent states that in view of the persistent complaints made in public regarding the management of the All India Radio, the Government of India proposes to appoint a commission of inquiry with non-official representatives, and as a first step a special administrative officer is being appointed for the purpose of introducing efficiency in the department. The erection of new broadcasting stations in different parts of India will necessarily give rise to new problems of considerable technical and national importance. Mr. Goyder, the technical adviser, is now conducting extensive field experiments, particularly from the Delhi short-wave and the Lahore medium-wave centres, to check up the existence of "black spots" in the broadcasting fields of India. Another important experiment is in connection with the prevention of reverberation in studios. The Indian Posts and Telegraphs Department is also experimenting with the problem of interference with radio reception from electric fans, refrigerators, tramways, &c.

Palestine.—AUTOMATIC TELEPHONY IN JERUSALEM.—Automatic telephony will come into operation in the Holy City on June 17th, when the new General Post Office building, work on which was started three years ago, is to open for public service. Costing nearly £125,000 to build and equip, the new G.P.O. in Jerusalem is of severe exterior design in locally quarried grey stone. Interior furnishing and decoration is up to modern British Post Office standards.—*Reuter.*

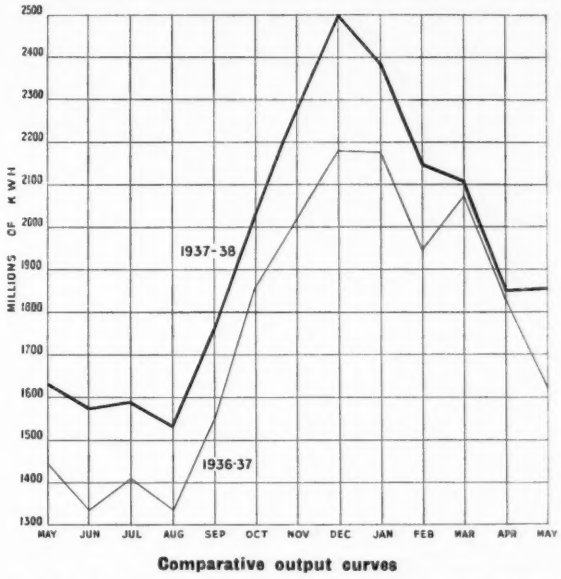
Sweden.—POPULARITY OF TELEPHONES.—The latest census of telephone subscribers in Sweden, taken on January 1st of this year, shows a total of 740,000, an increase of about 53,000 new subscribers during 1937. This is equal to a telephone density of 118 per thousand inhabitants.

NEW BROADCASTING STATIONS.—In addition to the present two experimental short-wave transmitters, the Swedish Post Office has decided to build a national short-wave station of 6 kW on a site near Motala. The shape of Sweden makes it difficult to "cover" the country effectively, and so far the problem has been solved by means of a network of small local stations, about thirty in number. The technical staff of the Swedish P.O., however, recommends the adoption of the British regional scheme and the gradual scrapping of the small stations. High-power transmitters have already been provided at Motala, Stockholm and Horby, and it is proposed to build at least four new 100-kW transmitters. Work on one is nearing completion at Lulea, and the Government recently granted 1,510,000 kr. for the erection of another at Stora Tuna.

Generation of Electricity in May

OFFICIAL returns rendered to the Electricity Commissioners show that 1,854 million kWh was generated by authorised undertakings in Great Britain during May, as compared with the revised figure of 1,621 million kWh in the corresponding month of 1937, representing an increase of 233 million kWh, or 14.4 per cent. The number of working days in the month (*i.e.*, excluding Sundays and Bank Holidays) was twenty-six as against twenty-four last year.

During the five months of this year up to the end of May the total amount of electricity generated by authorised undertakings was 10,341 million kWh, as compared with the revised figure of 9,648 million kWh for the corresponding period of 1937, representing an increase of 693 million kWh, or 7.2 per cent.



Comparative output curves

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdare.—June 20th. Electricity Department.—One 150-kVA and two 300-kVA transformers. (June 10th.)

Aberdeen.—June 20th. County Council. Electrical work at New Pitsligo housing estate (forty houses). County Clerk, County Buildings.

Aylesbury.—June 27th. Electricity Department. 33-kV, three-phase overhead transmission line. (See this issue.)

Barking.—June 27th. Corporation. Electrical installations for Scratton's Farm housing estate. (June 10th.)
July 4th. Electrical installations for Gascoigne School. (June 10th.)

Beckenham.—June 27th. Borough Council. Electrical installation at new clinic building, Hawes Down Schools, West Wickham. (June 3rd.)
Coal for the power station. (June 10th.)

Bolton.—July 14th. Electricity Department. Erection of a circular brick chimney at the Back o' th' Bank generating station. (June 10th.)

Brighton.—June 22nd. Corporation. One 20-kW Diesel-driven alternator for Laughton Lodge Colony, Sussex. (June 10th.)

Carnoustie.—Town Council. Electrical work at twenty-eight houses. Bruce, Son & Morton, architects, 10, Whitehall Street, Dundee.

Cheltenham.—June 28th. Borough Council. Electrical services in connection with the extension to the Town Hall and provision of medical baths. (June 3rd.)

Croydon.—July 4th. Electricity Department. Coal-handling and storage plant. (June 10th.)

Derwent.—June 30th. R.D.C. Two electrically driven centrifugal pumps, including motors, for Barlby pumping station. J. Townend, Clerk to the Council, 1, Abbey Place, Selby.

Dumfries.—June 25th. Dumfries and Galloway Royal Infirmary. Heating installation and alterations and extensions to electric lighting installation at Limehurst, Dock Park. J. A. Will, secretary and treasurer, 3, Great King Street.

East Grinstead.—June 27th. U.D.C. P.i., lead covered and armoured cables for twelve months. (See this issue.)

East Lothian.—June 23rd. County Council. Electrical work at additions and alterations to laundry block, Mental Hospital, Haddington. County Clerk, Haddington.

Edinburgh.—June 25th. Corporation. Installation of electric lighting and power in garage at refuse disposal plant, Russell Road depot. Town Clerk (deposit £1 1s.).

Egypt.—CAIRO.—July 18th. Ministry of Public Health. Electro-medical apparatus and accessories. (T.22795/38.)*

Exeter.—July 5th. Electricity Department. Fourteen transformers. (See this issue.)

Fife.—July 12th. Education Committee. Electrical installations at eleven schools, schoolhouses, &c. G. Sandilands, county master of works, County Offices, Kirkcaldy (deposit £1 1s.).

Gellygaer.—June 30th. Electricity Department. Electric cookers, wash boilers, kettles, irons, fire, lamps, cables, copper conductors, wiring accessories, meter boards and house service cut-outs for the period ending March 31st, 1939. (June 10th.)

Hastings.—June 27th. Electricity Department. Fire fighting installation for Shepherd Street sub-station, St. Leonards-on-Sea. (June 10th.)

Hemsworth.—June 20th. R.D.C. Electric lighting installation in forty houses and ten bungalows at South Kirkby. Clerk of the Council, District Council Offices, Cross Hill (deposit £2 2s.).

Horsham.—June 20th. Electricity Department. Steel street lighting columns, street lighting refractor lanterns and chokes and condensers for mercury discharge lamps. (June 3rd.)

Huddersfield.—June 28th. Electricity Department. Meter-testing equipment. (See this issue.)

India.—SIMLA.—July 7th. Indian Stores Department. Lighting equipment for the Karachi-Bombay air route. (T.Y.22683/38.)*

Iran.—Ministry of Ways and Communications, Teheran. Telegraph material, comprising copper wire, telegraph poles and insulators. (See this issue.)

Lancaster.—June 30th. Committee. Three 75-kW steam engines, d.c. generators and control panels for the County Mental Hospital. (June 10th.)

Leeds.—June 21st. Public Assistance Committee. Rewiring and retubing the electric lighting installation in wards at South Lodge, Lane End Place, Holbeck. Town Clerk, Room 57, Civic Hall.

Limerick (Eire).—July 2nd. Vocational Education Committee. Electrical installation at new schools. P. V. Twomey, chief executive officer, Municipal Technical Institute (deposit £5 5s.).

London.—July 1st. Commissioners of H.M. Works. Turbines, alternators, switchgear, reducing valves, desuperheaters, transformers, cables, cranes, batteries, frequency control, control signals, &c., for the Royal Ordnance Factory, Bishopton, Scotland. (June 3rd.)
June 27th. Metropolitan Water Board. Stores, including electric lamps for twelve months. The Clerk of the Board, 173, Rosebery Avenue, E.C.1.
BATTERSEA.—June 22nd. Borough Council. Coal for the period ending March 31st, 1939. (See this issue.)

Manchester.—June 29th. Electricity Committee. H.v. and l.v. cables for Stuart Street power station. (See this issue.)

Middlesex.—July 4th. County Council. Installation of electric lighting and supply and wiring of two bed lifts and radio equipment for West Middlesex County Hospital extensions, Isleworth. (June 3rd.)

New Zealand.—WELLINGTON.—August 2nd. Public Works Department. V.i.r. multicore cable. (T.Y. 22487/1938.)* 1,220 yd. of underground cable. (T.Y. 22486/38.)*
August 23rd. 1,000-V switchgear. (T.Y. 22750/38.)*
July 12th. Posts and Telegraph Department. 3,000 yd. of 250-V cable. (T.Y. 22399/38.)*
August 18th. Hard-drawn copper wire. (T. 22703/1938.)*

Rainhill (LANCS).—June 21st. Committee of Visitors. Electrical installation, including sewage pumping plant, at the County Mental Hospital. W. E. Bixter, Clerk and Steward (deposit £2 2s.).

Roxburgh.—July 8th. County Council. Heating and electrical installation at Newtown St. Boswells school. County Clerk, Newtown St. Boswells (deposit 10s. 6d.).

South Africa.—PRETORIA.—July 7th. Union Tender and Supplies Board. One 50-h.p. squirrel-cage motor and one a.c. portable welding set. (T.Y. 22931/38.)*
JOHANNESBURG.—July 19th. City Council. One testing transformer and three 75-kVA transformers. (T.Y. 23068/38.)*

Southampton.—June 25th. Electricity Department. Meter testing equipment. (See this issue.)

Tranent.—June 22nd. Town Council. Electrical work at New Row housing estate (twenty-four houses). C. R. Maitland, Town Clerk.

Uruguay.—MONTEVIDEO.—July 4th. Electricity Supply and Telephones Administration. 6,000 kg. of black insulating tape. (T.Y. 22539/38.)*

Wakefield.—June 27th. West Riding County Council. Installation of electric lighting at Huddersfield Royds Hall Grammar school and Maltby Grammar school. Clerk of the County Council, County Hall.

West Ham.—June 17th. Town Council. One 200-kW generating set and one five-panel switchboard for West Ham Hospital for Nervous and Mental Disorders, Goodmayes. J. W. T. Townley, engineer, Electricity Offices, 84, Romford Road, E.15 (deposit £1).

Whittingham.—June 23rd. Committee of Visitors. Electrical installation at the County Mental Hospital in connection with the erection of a nurses home. (June 10th.)

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Beaconsfield.—U.D.C. Accepted. Installation of electric lighting on the Malthouse Square estate (£198).—L. Dent.

Buckhaven and Methil (Fife).—Town Council. Accepted. Electrical work at fourteen houses at Methil (£113). Millar & Stables.

Cardiff.—Electricity Committee. Accepted. Testing equipment (£565).—Met.-Vick. Elecl. Co.

Darlington.—Town Council. Accepted. E.h.v. switchgear (£266).—A. Reyrolle & Co.

Portsmouth.—Electricity Committee. Accepted. Kiosks (£539 to £766 each) and switchgear.—English Electric Co. Battery (£1,308).—Tudor Accumulator Co.

Smethwick.—Health Committee. Recommended. X-ray equipment alterations: St. Chads Hospital (£200).—Watson & Sons. Clinic (£179).—L. G. Coade & Co.
Housing Committee. Accepted. Electrical installations in thirty houses and sixteen flats at Londonderry Road.—J. Hemming.

Torquay.—Entertainments Committee. Accepted. Stage lighting at the pier concert hall (£57).—Strand Electric Co.

West Hartlepool.—Town Council. Accepted. Three transformers.—Yorkshire Electric Transformer Co.

The British Standards Institution

A PLEA for further financial support from the Treasury for the work of the British Standards Institution was made by Dr. E. F. Armstrong, the retiring chairman, at a luncheon which followed the annual general meeting of the Institution at the Dorchester Hotel, Park Lane, W.1, on Tuesday. No institution, he said, was better supported by its members than theirs, but the activities of its 950 committees and the 18,500 persons who worked for them were being severely handicapped by lack of adequate committee-rooms. Congratulating the Institution on its work, Mr. Ronald C. Cross, Parliamentary Secretary to the Board of Trade, said that its importance was not limited to this country only, but was being realised all over the world. Australia, New Zealand and South Africa were endorsing the standards laid down by the Institution, which might thus be said to be fostering inter-imperial trade and fortifying it against the energies of other powers who were trying to enlarge their overseas markets. Almost every technical industry was now covered by the various committees, whose work was particularly valuable in the simplification and the comparison of tenders. Lieut.-Col. Lord Dudley Gordon pointed out that the ability to use the same technical language enabled problems to be discussed with other countries.

Notes

Transmission Section Summer Visit

Well in advance of the event, preliminary particulars have been announced of the summer visit of the Transmission Section of the I.E.E. It will be held on Saturday and Sunday, September 24th and 25th. The party will meet at Llandudno on the evening of September 23rd and on the following day will make a motor coach tour of inspection of the Penrhyn slate quarries, Trearddur Bay, Anglesey (where lunch will be provided by the North Wales Power Co.), the Penmon station of the B.B.C., and Beaumaris Castle. On the Sunday morning the vost are asked to notify the Secretary of the Institu- of the North Wales Power Co. and lunch will be provided by the J. L. Eve Construction Co., Ltd. In the afternoon the party will disperse. Those members wishing to participate in the visit are asked to notify the Secretary of the Institution as early as possible to enable the necessary accommodation to be arranged. The cost of the visit (excluding the fare to Llandudno) will be about £2 5s.

E.A.W. Activities

A visit on June 9th to Electric House, the showroom of the Willesden Borough Electricity Department, was attended by many London Branch members and residents of Willesden, including the Lady Mayoress. In a talk on "The new approach to housekeeping," Miss Caroline Haslett, the director, called electricity "the great ally of woman in the home," and pointed to the many ways in which it had transformed home life. She recalled the times when "woman's work was never done," and when the women engaged in housework had no leisure to devote to cultural development or public activities.

Institution of Heating and Ventilating Engineers

The summer meeting of the Institution of Heating and Ventilating Engineers will be held next week at the Royal Bath Hotel, Bournemouth. The Council meeting will be held on Monday morning and in the evening there will be dancing in the King's Hall. On Tuesday delegates will be welcomed by the Mayor of Bournemouth (Councillor J. B. Beale), following which Mr. A. C. Pallot will read a paper on "Air Raid Precautions." In the afternoon there will be a golf competition and a tennis tournament, and in the evening the banquet will be held at the Pavilion. Wednesday will be devoted to a circular motor drive.

Students' Joint Summer Outing

A joint summer outing of the Midland Students' and Graduates' Sections of the Institutions of Civil, Electrical, Mechanical and Structional Engineers will be held on June 25th at Maxstoke Castle, near Coleshill. The programme will include tennis, putting, bowls, archery, golf, fishing and swimming, and in the evening there will be a dance.

The E.I.B.A. at the I.M.E.A. Convention

The "Flag Day" collection made by the Electrical Industries Benevolent Association at the Torquay I.M.E.A. Convention amounted to about £51, and £21 was obtained from other sources, making a total of £72. The E.I.B.A. expresses its gratitude to Mrs. Hollyer, wife of the engineer and manager of the Torquay electricity undertaking, to Mrs. V. F. Gresham, president of the E.A.W. Torquay Branch, for organising the flag day, and to Mr. and Mrs. L. C. Sharp, who were mainly responsible for the other income.

Educational

Prospectuses are available from the Registrar, College of Technology, Manchester, 1, of courses leading to the Manchester University degrees and part time courses leading to the external degrees of London University in engineering and science.

(See our classified advertisements.)

The Engineers' Guild

The Engineers' Guild was inaugurated at a meeting in Caxton Hall, Westminster, on May 16th. Its objects, as stated in the temporary constitution adopted at the meeting, are: "To promote the social and economic welfare of the engineer, to stimulate public service in the profession, to encourage and develop the efficiency of the engineer, and to promote unity in the profession." Fifteen members were elected to form the Council with power to co-opt not more than eight additional members, and were charged with the duty of drawing up a revised constitution and by-laws before May 31st next. For the present membership is confined to members and associate members of the Institutions of Civil, Electrical and Mechanical Engineers and Naval Architects. Application for membership (subscription £1 1s.) should be addressed to Mr. T. W. Andrews, 68, Brooklands Park, S.E.3.

The E.I.B.A. in Scotland

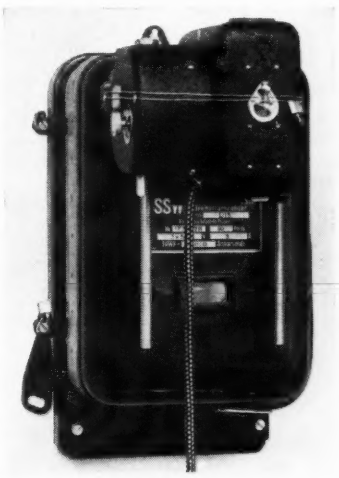
The Scottish Committee of the E.I.B.A. arranged a series of three luncheons on June 8th, 9th and 10th at Glasgow, Edinburgh and Dundee respectively, at which Mr. Ernest E. Sharp, President of the Association, met prominent people in the electrical world in Scotland. Lord Belhaven and Stenton, Patron of the Association for Scotland, extended the greetings of the Scottish members to Mr. and Mrs. Sharp at Glasgow, and the President expounded his plan for raising £190,000 this year to place E.I.B.A. finances on so firm a basis that they would be unassailable by whatever difficulties might lie ahead in the future.

Arc Lamps for Medical Purposes

A practical little twelve-page handbook, with fourteen illustrations, has been produced by Watson & Sons (Electro-Medical), Ltd., dealing with the installation and operating technique of "The Carbon Arc Lamp." Its primary purpose is to provide information for those about to install lamps of this kind or who look after them, and not to give particulars of dosage or other purely medical details. As the quality of the flame produced greatly affects the therapeutic results, a good proportion of the space is devoted to the choice of the correct carbons, and the manner in which they should be used in order to produce the proper results. The importance of adequate ventilation in a sunlight-treatment department is insisted upon.

A Meter Camera

For calculating rates of charging for electricity supplied to large industrial installations it is usual to employ a meter for registering the amount of energy consumed and also to provide means for determining what may be termed the utilisation factor of the contract load. Means of doing this which may be convenient for large installations are less satisfactory for smaller ones. To enable the same principle to be used whenever it may be desired the Siemens-Schuckert concern of Berlin



Meter with attachment for photographing the readings at regular intervals

has produced a camera for attachment to the front of an ordinary watthour-meter, so that the latter's dials are photographed at regular intervals on a sensitised roll. The camera is not provided with a shutter; the image of the meter dials is produced by a fixed lens in combination with two small lamps which are automatically caused to glow at appropriate intervals. The functions of switching on these lamps and keeping the photographic paper band in motion are performed by clockwork mechanism driven by a small motor and separately housed in a second component that is plugged into the side of the camera case. The camera and its driving component are strapped to the front of the meter and fastened with lead seals. The paper band is long enough to permit half-hourly pictures to be taken for a week without reloading the camera. The intervals between photographing can be varied from fifteen minutes to one hour.

Enamelled Reflectors

British Standard 232 (published in 1938) for vitreous-enamelled steel reflectors for electric light (open dispersive type) has just been revised. The efficiency of reflectors from 100-1,500 W has been increased from 60-70 per cent. A method of determining the distribution of light has been included as well as a number of other minor modifications. Copies of this revised standard 232-1938 may be had from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

Appointments Vacant

Assistant borough electrical engineer for Barnes Electricity Department.

Assistant engineer in the distribution department of Sheffield Electricity Department.

Resident assistant engineer for the Kent County Mental Hospital, Chartham, near Canterbury.

Installation inspector for Reading Corporation.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

REX hair-dryer.

HALL THOR KELIN arc lamps.

Readers should enclose stamped addressed envelopes when making their enquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Birthday Honours.—The first Birthday Honours list of King George VI was published last week, and we give below the names of those gentlemen included who are connected with the electrical and allied industries:—

Lord Weir, who was chairman of the 1925 committee which led to the establishment of the Central Electricity Board, and who is also vice-president of B.E.A.M.A., is created a Viscount, and **Mr. V. H. Smith,** a director of Associated Electrical Industries, Ltd., has had a barony conferred upon him.

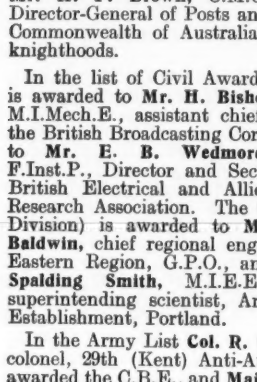
Sir Cyril W. Hurcomb, K.B.E., C.B., chairman of the Electricity Commission, becomes a K.C.B. (Civil Division).

Mr. C. H. Smith, who receives a knighthood, is senior partner in a firm of chartered accountants. He is chairman of the Midland Electric Manufacturing Co., Ltd., deputy-chairman of Brown Bros., Ltd., and a director of W. Canning & Co., Ltd., and W. & T. Avery, Ltd. **Mr. S. Turner,** chairman of Turner & Newall, Ltd., and **Mr. H. P. Brown,** C.M.G., M.I.E.E., Director-General of Posts and Telegraphs, Commonwealth of Australia, also receive knighthoods.

In the list of Civil Awards the C.B.E. is awarded to **Mr. H. Bishop,** M.I.E.E., M.I.Mech.E., assistant chief engineer of the British Broadcasting Corporation, and to **Mr. E. B. Wedmore,** M.I.E.E., F.Inst.P., Director and Secretary of the British Electrical and Allied Industries Research Association. The O.B.E. (Civil Division) is awarded to **Mr. F. G. C. Baldwin,** chief regional engineer, North-Eastern Region, G.P.O., and to **Mr. B. Spalding Smith,** M.I.E.E., F.Inst.P., superintending scientist, Anti-Submarine Establishment, Portland.

In the Army List **Col. R. C. Milliken,** T.D., M.I.E.E., hon. colonel, 29th (Kent) Anti-Aircraft Battalion, R.E. (T.A.), is awarded the C.B.E., and **Major C. C. H. Brazier,** M.I.Mech.E., A.M.I.E.E., Kent Fortress Engineers, R.E. (T.A.), receives the O.B.E.

The Earl of Clarendon, K.G., P.C., G.C.M.G., and **Mr. T. W. Heather,** M.C., have joined the board of the General Electric Co., Ltd. Mr. Heather's service with the G.E.C. commenced towards the end of 1913, when he joined the audit department of the company. Less than a year afterwards war broke out and his career was interrupted by his service in the Army. He was awarded the M.C. and bar, and was mentioned in dispatches. On rejoining the company in 1919 he was appointed assistant manager of the publicity department, which position he occupied until 1925, when he became personal assistant to Mr. M. J. Railing, vice-chairman and joint managing director of the company. In 1933 he was appointed sales manager. Mr. Heather is a B.E.A.M.A. representative on the Fair Trading Council, and played an important part in the deliberations which led to the formulation of the Fair Trading Policy. He takes a very active interest in the social affairs of the company.



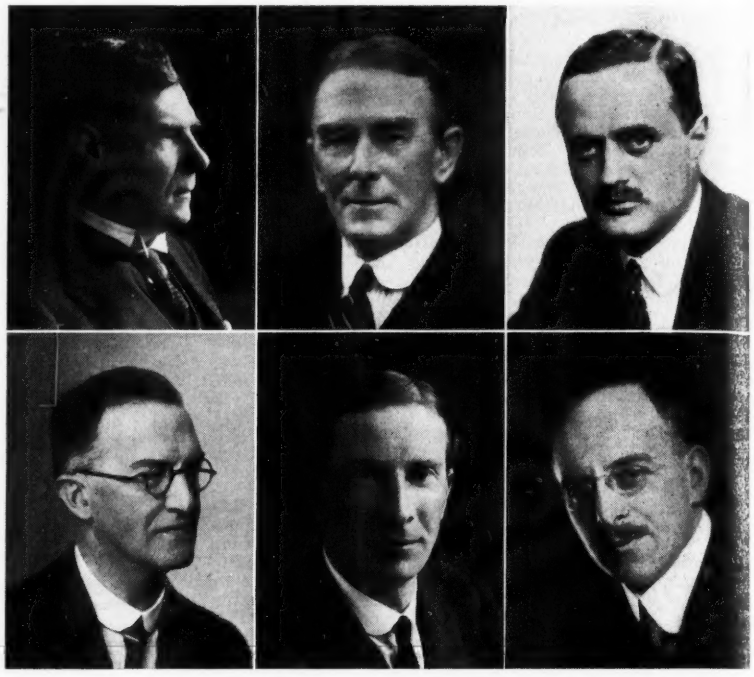
Mr. T. W. Heather

Mr. R. Wilkie, Markinch, has been appointed plant engineer in the new power station of the Fife Coal Co. at Bowhill. He served his apprenticeship as an engineer with Tullis, Russell & Co., Ltd., paper makers, Markinch, and later gained experience as a travelling engineer with the West End Engineering Co., Edinburgh. He then returned to Tullis, Russell & Co., where he was employed in the power station for nine years. As a parting gift from the staff of the company Mr. Wilkie received an oak grandmother Westminster-chime clock. Mr. J. R. Happer, chief engineer, made the presentation.

Ex-Bailie J. M. Bryce, of Kilmarnock, was unanimously reappointed chairman of the Ayrshire Electricity Board at the recent annual meeting.

Mr. F. Hayton, district engineer for the North-Eastern Electric Supply Co., Ltd., at Chester-le-Street, Co. Durham, who has been appointed area assistant engineer at Carliol House, Newcastle-on-Tyne, has been presented with an electric clock by colleagues at Chester-le-Street.

It was reported to the Torquay Town Council at its last meeting that the resignation of **Mr. E. W. Mackay,** distribution engineer, took effect from May 31st, and it was resolved that the vacancy be advertised at a commencing salary of £550 per annum.



In the Birthday Honours List (top row, left to right): Sir Cyril Hurcomb, Mr. C. H. Smith and Mr. H. Bishop. Bottom row: Messrs. E. B. Wedmore, B. Spalding Smith and F. G. C. Baldwin *(All Elliott & Fry, except Mr. C. H. Smith, Percy Wynne (Birmingham)*

Dr. F. W. Haywood, Ph.D.(Lond.), B.Sc.(Hons.)Lond., A.I.C., has been appointed to the position of chief metallurgist to Wild-Barfield Electric Furnaces, Ltd., to take charge of the new research department which is nearing completion. Dr. Haywood, who is at present engaged with I.C.I. (Fertiliser and Synthetic Products), Ltd., at Billingham, will commence his new duties later in the year.

Sir Oliver Lodge celebrated his eighty-seventh birthday on June 12th.

Mr. E. Golland has resigned his position with George H. Scholes & Co., Ltd., of Manchester, to become joint managing director of the Rodney Motor Co., Ltd., Liverpool. Mr. Golland has been connected with the electrical industry for thirty years, and was for some years with Marconi's.

Bradford Corporation Transport Committee has appointed **Mr. L. L. Christie,** general assistant to the traffic manager, Birmingham and Midland Motor Omnibus Co., Ltd., as traffic superintendent.

Mr. D. D. Watson, M.I.E.E., is resigning his position as general manager of African Cables, Ltd. He was a pioneer of the electric cable industry in South Africa, and it was largely due to him that the company's Vereeniging factory was successfully inaugurated in such a short time. His connection with the company will not be entirely severed, as he is to continue to act in an advisory capacity.

Mr. D. D. Watson

Mr. L. Newton Davy has been appointed to the board of directors of British Mechanical Productions, Ltd., manufacturers of "Clix" electrical accessories, radio and aircraft components. He is resigning his position with J. H. Tucker & Co., Ltd., in order to take up his duties as director and sales manager at the end of this month.

Messrs. Highfield & Roger Smith, consulting engineers, of 36, Victoria Street, London, S.W.1, and Unitas House, Birmingham, have taken into partnership as from June 1st **Mr. E. Ambrose,** M.I.E.E., and **Mr. A. L. Coward,** A.M.I.E.E. Mr. Ambrose, following his technical education and mechanical

and electrical training, was appointed an assistant engineer with the Notting Hill Electric Lighting Co., Ltd. His next appointment was that of assistant engineer on the staff of the Metropolitan Electric Supply Co., Ltd. In 1918 he joined the staff of J. S. & W. E. Highfield (later becoming Highfield & Roger Smith), consulting engineers, as chief assistant engineer. Mr. Ambrose is a past-chairman of the Junior Institution of Engineers, and has been for some years lecturer and demonstrator in electrical engineering to students at the Regent Street Polytechnic. Mr. Coward received his technical training in the Manchester School of Technology. Joining Dick, Kerr & Co., he supervised the installation and running of the machines in connection with the Thury system introduced by Mr. J. S. Highfield for high-voltage d.c. transmission in West London. He was engaged in the equipment of railway plant, and also installed several special types of high- and low-voltage d.c. plants, as well as general factory equipments. For a time after the war he assembled flying boats made by Dick, Kerr & Co., under Mr. W. E. Highfield's supervision, and assisted in the design of d.c. machinery for the English Electric Co. In 1923 he joined the staff of Highfield & Roger Smith to supervise the re-equipment and extension of the South Wales Power Co.'s generating station at Upper Boat, and in 1928, when the firm started on the construction of the grid in Central England for the Central Electricity Board, he took charge of the Birmingham office.

Mr. **R. Coffee,** who has left the South London Electric Supply Corporation, Ltd., after twenty-four years on the technical staff, has been presented by his late colleagues with an electric clock and a toaster. He has been appointed senior engineer-in-charge at the Wandsworth station of the County of London Electric Supply Co., Ltd. Mr. Coffee was previously with the London Electric Supply Corporation, Ltd., and Marconi's Wireless Telegraph Co., Ltd., after serving his apprenticeship with J. Stewart & Son, Blackwall Iron Works, Blackwall, E.

Sir **Charles H. Bressey,** C.B., C.B.E., has accepted the invitation of the Council to become President of the Junior Institution of Engineers for the 1938-39 session.

Mr. **J. Keir,** B.Sc., A.M.I.E.E., who received his training with the MacFarlane Engineering Co., Ltd., and Lancashire Dynamo & Crypto, Ltd., has now joined the London sales staff of Bull Motors. Mr. Keir was previously on the London sales staff of Lancashire Dynamo & Crypto, Ltd.

Mr. **C. Cameron Kirby,** engineer and manager of the Alderley Edge & Wilmslow Electricity Board, has been elected president of the Wilmslow & Alderley Edge Rotary Club for 1938-39.

Sir **John Reith,** Director-General of the British Broadcasting Corporation, has been appointed whole-time chairman of Imperial Airways, Ltd. Sir John was appointed the first general manager of the B.B.C. in 1922, and he has guided the work of building up the organisation from its inception.

Mr. **A. Farrer,** district engineer in the distribution department of Grimsby electricity undertaking, is shortly leaving to take up a new post at Bath. He is to be succeeded at Grimsby by Mr. **W. Stapleton,** assistant to one of the undertaking's district engineers.

Mr. **L. C. Holt,** manager of the Southampton branch of the General Electric Co., Ltd., is retiring at the end of the present month at his own request. Mr. Holt has been in charge at Southampton since the company established itself in the town in 1912, and he has served nearly fifty years with the company. He will be succeeded as manager by Mr. **H. W. Wilson,** at present assistant manager, and Mr. **H. E. Carmody,** of the head office sales department, will take up the post vacated by Mr. Wilson.

Mr. L. C. Holt

On June 7th at St. Paul's Church, Wimbledon Park, **Miss Joan B. Kennedy,** until lately librarian to the British Electrical Development Association, was married to Mr. L. J. Davis, of the Vitrea Drawn Sheet Glass Co.

At the Governors' Speech Day at Harrow School on June 14th, a memorial window to the late **Sir Francis Fladgate,** chairman of the committee of the Harrow Association from 1910 to 1928 was unveiled in the War Memorial Building by the Bishop of Lincoln. Sir Francis was chairman of the London Power Co., Ltd., and was associated with other London electricity supply companies.

Obituary

Prof. W. A. Bone.—The death occurred on June 11th, at the age of sixty-seven, of Prof. William Arthur Bone, chief professor and head of the Department of Chemical Technology at the Imperial College of Science and Technology, South Kensington. He was appointed chief professor of chemical technology in 1912, and was at one time consultant to the Fuel Research Board. Prof. Bone was constantly working for the introduction of improved methods of using fuels of all kinds and for the elimination of waste, and in 1931 he was awarded the Melchett Medal by the Institute of Fuel for outstanding work on the preparation and use of fuel. He was a Fellow of the Royal Society, which awarded him the Davey Medal in 1905 in recognition of his researches on the mechanism of the combustion of hydro-carbons and on the nature of flame and gaseous explosions.

Mr. H. Newby.—The death occurred on June 10th, after a short illness, of Mr. Harry Newby, senior partner of Newby & Son, Phœnix Foundry, West Bromwich.

Will.—Mr. Gustaf Charles Lundberg, M.I.E.E., of A. P. Lundberg & Sons, Ltd., left £19,494 with net personalty £13,246.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares.

New Companies Registered

Bescol Relay Switches, Ltd.—Private company. Registered June 3rd. Capital, £1,000. Objects: To carry on the business of manufacturers of and dealers in all kinds of electrical equipment, &c. The directors are: J. Macmahon, 80, Lakey Lane, Hall Green, Birmingham, and V. Blundell, 6, Plough and Harrow Road, Edgbaston, Birmingham. Registered office: Shenstone House, Marsh Hill, Erdington, Birmingham.

Radio Clearance, Ltd.—Private company. Registered June 3rd. Capital, £2,000. Objects: To acquire the business of radio manufacturers and dealers carried on by D. B. Drew and T. J. Dutfield at 63, High Holborn, W.C.1, as Radio Clearance. The permanent directors are: D. B. Drew, Broadlawns, Molember Road, East Molesey, Surrey, and T. J. Dutfield, 9, Grove Road, Woodford, Essex. Registered office: Dominion Buildings, 2, South Place, E.C.2.

Temde Electric Co., Ltd.—Private company. Registered June 8th. Capital, £500. Objects: To carry on the business of makers, exporters and importers of and dealers in electric light fittings in wood and parts thereof, &c. The subscribers are: V. H. Neill and V. Elsworth, both of 3-4, Clement's Inn, W.C.2. Solicitors: Buckeridge & Braune, 3-4, Clement's Inn, W.C.2.

Australux Electrical Industries, Ltd.—Private company. Registered June 8th. Capital, £100. Objects: To carry on the business of electricians, mechanical engineers and manufacturers, &c. The permanent directors are: W. T. Wildman, 20, Wellington Avenue, N.15, M. P. Martin, 19, Cranley Gardens, N.10, and R. J. Sullivan, 34, The Laurels, N.13. Registered office: 54, St. John's Square, E.C.1.

Radio Bargains, Ltd.—Private company. Registered June 8th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in gramophones, records, sound boxes, wireless aerials, index dials, knobs, headphones, wireless apparatus, &c, The directors are: L. A. W. Hawkins, 162, Above Bar, Southampton, C. R. Foot, Ballater, Deacon Crescent, Southampton. Registered office: 162, Above Bar, Southampton.

Antilum, Ltd.—Private company. Registered June 3rd. Nominal capital, £5,000. The objects are to acquire licences or other rights in respect of a certain invention of products which absorb ultra-violet radiations, referred to in an agreement and a licence dated May 23rd, 1938, between Antilum Aktiengesellschaft and E. A. Haas. The subscribers are: G. H. Woodcock and F. H. Webb, both of 2, Bond Court, Walbrook, E.C.4. Solicitors: Linklaters & Paines, 2, Bond Court, E.C.4.

E. A. Haas (Antilum), Ltd.—Private company. Nominal capital, £100. Objects: To acquire from E. A. Haas the benefit of an agreement and of a licence dated May 23rd, 1938, between himself and Antilum Aktiengesellschaft relating to certain inventions of products which absorb ultra-violet radiations, to indemnify E. A. Haas in respect thereof, and to deal with, exploit and turn to account the subject matter of the said agreement and licence. The subscribers and other particulars are similar to those of Antilum, Ltd.

Steatite Insulations, Ltd.—Private company. Registered June 7th. Capital, £100. Objects: To carry on business as manufacturers of and dealers in vitrified and refractory steatite insulators, insulators and heat resisting materials of all kinds, electrical plant, &c. The directors are: J. W. C. Jones (chairman) and Mrs. G. J. N. Jones, both of 177, Ravenhurst Road, Harborne, Birmingham. Secretary: A. Clements. Registered office: 177, Ravenhurst Road, Harborne, Birmingham.

Waterville Electricity Supply Co., Ltd.—Private company. Registered in Dublin on June 9th. Nominal capital, £1,000. Objects: To carry on the business of an electricity supply

company. The directors are: G. J. Cantwell, 1, Longford Terrace, Monkstown, Co. Dublin, and E. L. Cantwell, Cahirciveen, Co. Kerry.

Electric Homes, Ltd.—Private company. Registered June 9th. Capital, £400. Objects: To carry on the business of manufacturers of and dealers in electrical appliances, &c. The directors are: A. E. F. Luck, 129, Addington Road, West Wickham, and three others. Registered office: Whitgift Chambers, 84-86, High Street, Croydon, Surrey.

Godiva Engineering Co., Ltd.—Private company. Registered June 11th. Capital, £2,700. Objects: To carry on the business of general mechanical, electrical, radio, motor, marine, constructional, ventilating, heating and refrigerating engineers, &c. The directors are T. Perry, 63, Burns Road, Coventry, and J. Clutterbuck, 435, Walsgrove Road, Coventry. Registered office: All Saints Lane, Coventry.

Dunston Manufacturing Co., Ltd.—Private company. Registered June 8th. Capital, £500. Objects: To carry on the business of mechanical, electrical, marine, constructional, internal combustion and general engineers, manufacturers of and dealers in plant, machinery, tools, engines, &c. The directors are: J. E. Smiles, 7, Limetrees Gardens, Gateshead-on-Tyne; W. Durkin, 19, Market Lane, Dunston-on-Tyne; W. Hindmarch, Hexham Road, Dunston-on-Tyne; and J. Hindmarch, 1, Elsdon Gardens, Dunston-on-Tyne. Registered office: Hexham Road, Dunston-on-Tyne.

F. & J. Turnbull (Motors), Ltd.—Private company. Registered in Edinburgh June 10th. Capital, £2,000. Objects: To carry on the business of motor, electrical, mechanical, constructional, radio and general engineers, and merchants, &c. The directors are: F. G. Turnbull, 13, Garden Street, Falkirk; and J. A. Turnbull, 42, Gartcows Road, Falkirk. Registered office: Manse Place, Falkirk.

Returns of Electrical Companies

Transport and General Neon, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 31st, 1938, to secure £2,150. Holders: Ancell Property Company, Ltd., 31, Fann Street, E.C.

Electrical Equipments (Cardiff), Ltd.—The nominal capital has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £500.

Hallamshire Electric Co., Ltd.—Mortgage on freehold land in Charles Street, Sheffield, with Canada Works thereon, dated May 19th, 1938, to secure all moneys due or to become due from the company to Martins Bank, Ltd.

F. E. Rowland & Co., Ltd.—First mortgage debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 10th, 1938, to secure all moneys due or to become due from the company to Martins Bank, Ltd.

Electric Rollers, Ltd.—Capital, £500 in £1 shares. Return dated December 31st, 1937 (filed May 12th, 1938). 500 shares taken up. £500 paid. Mortgages and charges nil.

Consolidated Signal Co., Ltd.—Capital, £425,000 in £214,195 preferred stock and £150,548 ordinary stock, and 5,805 preferred and 54,452 ordinary shares of £1. Return dated March 22nd, 1938. All stock taken up. £52,839 paid on £24,999 preferred and £27,840 ordinary stock. £311,904 considered as paid on £189,196 preferred and £122,708 ordinary stock. Mortgages and charges nil.

Simmonds & Stokes, Ltd.—Capital, £15,000 in £1 shares. Return dated February 16th, 1938. 10,204 shares taken up. £1,725 paid. £8,479 considered as paid. Mortgages and charges £11,000.

Alger's Wholesale Supplies, Ltd.—The nominal capital has been increased by the addition of £2,900 in £1 ordinary shares beyond the registered capital of £100.

Electrical Distribution of Yorkshire, Ltd.—Satisfaction in full on May 31st, 1938, of three mortgages dated February 17th, 1913, July 26th, 1921, and February 11th, 1919, and registered February 18th, 1913; August 2nd, 1921, and February 20th, 1919, respectively.

Blockley Electrical Engineering Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1937 (filed April 5th, 1938). All shares taken up. £1,000 paid. Mortgages and charges nil.

Westminster Engineering Co., Ltd.—Capital, £25,500 in 12,500 preferred and 13,000 ordinary shares of £1. Return dated December 10th, 1937 (filed April 7th, 1938). 9,279 preferred and 9,071 ordinary shares taken up. £14,550 paid on 7,479 preferred and 7,071 ordinary shares. £3,800 considered as paid on 1,800 preferred and 2,000 ordinary shares. Mortgages and charges nil.

Martindale Electric Co., Ltd.—Capital, £200 in £1 shares. Return dated January 13th, 1938. 139 shares taken up. £139 paid. Mortgages and charges nil.

Superlamp, Ltd.—Satisfaction (a) in full on March 18th, 1938, of charges dated February 24th, 1930, and August 23rd, 1929, and registered August 6th, 1937, and (b) to the extent of £2,500 on March 25th, 1938, of charge dated December 24th, 1932, and registered August 6th, 1937.

City Notes

Callender's Cable & Construction Co., Ltd.—Presenting his report at the company's forty-second ordinary general meeting on Wednesday, Sir Fortescue Flannery, the chairman, said that he was once more in the happy position of submitting accounts showing the largest gross profit in the history of the company, this, too, in spite of heavier taxation. The excellent good will which the company enjoyed had again resulted in the renewal of a large number of annual contracts for main cables, and in 1937 a record tonnage of copper was dealt with at Erith. As a consequence, and to meet the demand for greater output and prompt delivery, they had substantially modified and enlarged the cable factory at Erith during the year. The new armouring, testing and packing shops were, they believed, the best equipped and most spacious workshops of their kind in the world. The general effect of a more complete centralisation of operations was bound to have a beneficial result in economical manufacture. So successful had been the business in light castings that it had been necessary to buy further land and plant at Willenhall. Sales of ship wiring cables produced at the Anchor Works had been nearly 30 per cent. higher than in 1936; in fact, almost all the leading shipbuilders ordered cables, including ring main rubber insulated and other types for the new Cunard liner *Queen Elizabeth*. During the past twelve months several new cable factories had come into production, but active steps had been taken which would, it was hoped, effectively meet the keener competition. While sympathising with the sufferings of those in the Distressed Areas, it was difficult to understand the appeal made to customers to place business in factories erected there. The plant already available in the country was more than adequate to meet the demand, and therefore any reduction in the work given to existing factories must inevitably create in some degree the very evil which the new factories had been built to remove.

Business had not been very seriously affected by the rearmament programme, although the Anchor Works had received valuable orders from Government Departments. The principal effect had been to stiffen the prices of all materials. Their associated company, Painter Bros., had paid a record dividend, while the Okonite-Callender Cable Co., Inc., had, in spite of adverse conditions, at last made a profit. It was difficult to see what public benefit would be obtained by the proposed Government legislation to enable large electricity supply undertakings to absorb the smaller ones. Regarding the future, Sir Fortescue said that it would be misleading at a time when the world situation was so disturbed to predict too optimistically the results of the current year, but he was happy to say that both their works at Erith and Leigh were full of orders. The chairman concluded by moving the adoption of the report and accounts and the payment of the dividend and bonus recommended. This resolution was seconded by Sir T. O. Callender. Mr. W. G. Hendrey then gave a brief account of the company's export business, which, he said, showed a very considerable expansion as compared with the previous year. In Australia sales of both underground mains and rubber wires showed a marked improvement. Business in New Zealand, South Africa and India had also expanded. In Southern India the large schemes of overhead transmission which they had been carrying out for some years for the Madras Electricity Department were drawing to a close, but they hoped that there would be sufficient new orders to keep their staffs employed there in the future. The work in Travancore had continued and the company was now operating the electricity supply undertaking at Secunderabad. In spite of the war conditions business in China had been greater in 1937 than in 1936. During the past few years trade with the Continent had been small, but here again there was a considerable increase in turnover. The report and accounts were adopted unanimously as was also a resolution re-electing Sir Fortescue Flannery chairman. Messrs. Charles Pipkin, P. V. Hunter and W. G. Hendrey were elected to the board, an extraordinary meeting approving a resolution increasing the number of directors permissible from seven to ten. The board now consists of eight members.

The Brush Electrical Engineering Co., Ltd.—A meeting of the holders of ordinary stock and shares was held on June 14th for the purpose of submitting a scheme of arrangement. Sir Ronald W. Matthews (chairman), who presided, said that it was obvious from the balance sheet that the company could not continue in business without a drastic reorganisation of its capital. Not only was it necessary to deal with the existing bank and trade liabilities, but they must have further capital for modernising the plant and for supporting a larger volume of business. The late board obtained reports from independent consultants who had emphasised the necessity for new tools, equipment and plant reorganisation. With new capital this could be achieved. Already the management had been thoroughly overhauled and new appointments made to important administrative positions in the company. The present condition of the order book was satisfactory, and there were signs of further expansion in the future. This healthier position would involve the provision of working capital. In these circumstances they had succeeded in negotiating with R.E.D. Trust, Ltd., to subscribe new prior lien debenture stock and to underwrite an issue of further ordinary shares on the basis laid down in the scheme. They believed that the reorganisation of their finances and the administrative appointments referred to would not only assist them in the production of their manufactures, but would also increase the confidence of purchasers in placing with the company large orders involving, as such contracts must, a considerable period of manufacture and the expenditure of large sums. Under the scheme the existing stockholders were given the option to subscribe for the new ordinary share capital, and such subscription carried with it certain option rights which, in the event of the company achieving success should be of substantial further value to the stockholders. The board anticipated that the offer of the new shares would be made in September next. Assuming that the proposals were carried there was every prospect of the business being re-established on a profit-earning basis. The scheme submitted was approved and the proposals were also sanctioned at subsequent meetings of the holders of 4½ per cent. perpetual debenture stock and 4½ per cent. perpetual second debenture stock as well as at the annual and extraordinary meetings.

Ward & Goldstone, Ltd., report a net profit for the year ended March 31st of £74,546, as compared with £55,275 in the preceding year, and after deducting directors' fees (£375), income tax (£12,475), N.D.C. (£3,500) and depreciation (£12,619), and adding £32,099 brought in, there is a balance available of £77,676. It is proposed to pay a final dividend of 15 per cent. on the ordinary shares, making 20 per cent., less tax, for the year, to place £12,000 to reserve, and to write off goodwill account £32,000, leaving £16,926 to be carried forward.

In the previous year the ordinary dividend was 15 per cent., plus a scrip bonus of 10 per cent. Following the annual meeting on July 14th an extraordinary meeting will be held at which resolutions will be submitted for converting the preference and ordinary shares into preference and ordinary stock.

Hick, Hargreaves & Co., Ltd., report a profit for the year ended March 31st of £56,082, and after providing for depreciation, debenture interest, income tax and N.D.C. there is a net profit of £37,297, which with £2,508 brought forward makes £39,804. It is proposed to pay a final dividend of 3 per cent., making 5 per cent., less tax, for the year, and to pay a bonus of 3 per cent. General reserve receives £15,000, and the balance carried forward is £5,604.

The Revo Electric Co., Ltd., reports a net profit for the year ended March 31st of £137,917, as compared with £103,344 in the preceding year, and after deducting £36,852 for income tax, N.D.C., directors' fees and contribution to staff pension and life assurance scheme, and adding £55,540 brought in, less interim dividend paid, there is an available balance of £143,479. It is proposed to pay a final dividend of 12½ per cent., making 17½ per cent. for the year, to transfer £25,000 to reserve, and to provide £17,500 for a capital bonus of five new shares for every 100 now held, leaving a balance to be carried forward of £69,261.

The Lisbon Electric Tramways, Ltd.—Presiding at the annual meeting held on June 14th Mr. F. W. Kerr (chairman) said that the traffic had been more than maintained during the year under review, the number of passengers carried increasing by 3.8 million to 125.9 million. They had in hand a programme of building new cars as well as reconditioning their existing rolling stock. This had resulted in thirty-five new cars being put into service in the past three years. In addition, over the past six years eighty open-type cars had been converted to the closed type and they were now replacing the remaining ones with the latest type of closed cars. They proposed to retain the open cars for special services to meet abnormal demands. To provide the power for increased traffic a new boiler was being installed at the power station, as well as new cables and sub-stations. It was necessary also to take into account other construction expenditure in the near future; new tracks, car sheds, sub-stations, &c., must be provided to keep pace with the rapid growth of Lisbon, where a complete plan of urbanisation was now in preparation by the Camara which would enable the company to study all future track extensions in relation to the general plan referred to.

The Electrical Finance and Securities Co., Ltd.—Presiding at the annual meeting held on June 9th Mr. G. H. Nisbett (chairman), said that the comparative retrocession in the revenue figure was due to the reductions in price that they had given to consumers, the reward for which they hoped to reap in due course through increased turnover. So far in the current year the progress of their companies had been well maintained. The projected Bill for the reorganisation of electricity supply had not yet made its appearance, and meanwhile opposition to the proposals had grown in strength and there were some indications that the Bill might not be proceeded with. The advances that the applications of electricity supply in this country had made and were continuing to make under the existing managements must be admitted on all hands to be eminently satisfactory, and it would seem most advisable to leave well alone in case worse befell.

Newman Industries, Ltd., has now convened special meetings to consider amended resolutions for increasing the capital. It is proposed to raise the capital to £210,000 by creating 100,000 6 per cent. redeemable cumulative preference £1 shares and 200,000 ordinary 2s. shares. The directors have deemed it advisable to take advantage of this opportunity to create 150,000 ordinary shares (in addition to the 50,000 shares originally proposed to be created) for issue as and when required. In other respects the arrangements are as set out in the circular sent to shareholders in April. It is hoped to issue the 100,000 preference shares after the extraordinary general meeting has been held. Class meetings to consider the proposals will be held on June 20th, and the extraordinary general meeting will be held on June 27th.

The British Oxygen Co. is holding an extraordinary meeting on July 4th at which a resolution will be submitted for increasing the capital from £4,000,000 to £6,000,000 by the creation of 2,000,000 cumulative second preference £1 shares ranking immediately behind the existing 6½ per cent. cumulative preference stock. The new preference shares will be converted into preference stock as and when such shares are from time to time issued and fully paid. The directors intend to offer at an early date for public subscription 1,000,000 of the new shares as 5 per cent. cumulative second preference shares.

Telephone Rentals, Ltd., reports a net profit for the year ended May 31st of £110,492, as compared with £108,254 in the preceding year, and after deducting income-tax (£29,617) and adding £47,508 brought in, it is proposed to place £30,000 to general reserve, leaving £77,383 available. The final ordinary dividend is 6 per cent., making 10 per cent. for the year (same on smaller capital), and £42,533 is carried forward. It is proposed to increase the capital to £1,000,000 by the creation of 800,000 ordinary shares of 5s. each. Resolutions to give effect to the increase and to authorise the utilisation of £25,000 from capital reserve for development purposes will be submitted at the annual meeting to be held on June 20th.

The Electric Furnace Co., Ltd., reports a net profit for the year ended March 31st of £27,579, as compared with £30,417 for 1936-37, to which is added £6,513 brought in and £1,000 taxation reserve brought back, and after deducting directors' remuneration voted at the last annual meeting (£3,020) there is a total available of £32,072. It is proposed to pay a final dividend on the ordinary shares of 5½ per cent., making 8 per cent. for the year (same), to place £10,000 to general reserve, and to carry forward (subject to directors' remuneration) £8,972. The report states that the Dominion market for electric furnaces has been active, owing to greater prosperity in general, and particularly in the mining industry. Foreign orders have increased substantially, but the demand for furnaces is likely to show diminution in this country in some branches of the old-established heavy industries. On the other hand, the precise control of operation necessary for the manufacture of new alloys can often only be obtained by the use of electricity. This is likely to result in an increased demand for the company's equipment. The subsidiary company has again been successful.

The General Electric Co., Ltd.—In a preliminary statement the company reports record profits for the year ended March 31st of £1,772,181, an increase on the previous year of £167,669. The ordinary cash bonus is increased by 2½ per cent. to 10 per cent., less tax, and the dividend is maintained at 10 per cent. The distribution for the year is thus 20 per cent. (against 17½ per cent.). The annual meeting will be held on June 27th.

Ruston & Hornsby, Ltd., report a profit for the year ended March 31st of £204,876, as compared with £140,906 in the preceding year, to which is added £50,124 brought in. The dividend for the year on the ordinary stock is 7½ per cent. (against 6¼ per cent.), reserve for income-tax and N.D.C. receives £20,000 and general reserve £57,450. The balance carried forward is £61,801.

The Great Northern Telegraph Co., Ltd., of Denmark, reports traffic receipts for 1937 of £658,475, as compared with £675,808 in the previous year, which with interest (£261,493), sundries (£55,427), and a balance of £482,294 brought in, makes a total of £1,457,689 (£1,490,063). After deducting expenditure of £585,258 there is a balance of £872,431. It is proposed to pay a final dividend of 7½ per cent., making 12½ per cent. for the year, plus a bonus of 7½ per cent. (same), and to carry forward £469,976.

Newman & Watson, Ltd., have declared a dividend at the rate of 6 per cent. per annum for the six months ended March 31st on the 120,000 6 per cent. cumulative preference shares. This is payable out of profits for the year ended March 31st. The dividend now announced was due for payment on that date, but was deferred.

The Victoria Falls and Transvaal Power Co. has declared a final dividend on the ordinary shares of 9½ per cent., making 13½ per cent., less tax, for the year (against 12 per cent.).

Chadburns Ship Telegraph Co. is paying a first and final dividend of 6 per cent., plus a bonus of 4 per cent., making 10 per cent., less tax (same)

The International Combustion Co., Ltd., has declared an interim dividend of 7½ per cent., less tax, on the ordinary shares (same).

The Rheostatic Co., Ltd., is paying an interim dividend of 4 per cent. (unchanged).

Mirrlees, Bickerton and Day, Ltd., have declared a first and final dividend of 4 per cent. (against 2½ per cent.).

The Young Accumulator Co. (1929), Ltd., has announced a first and final dividend of 3½ per cent. (against 3 per cent.).

The British Vacuum Cleaner and Engineering Co., Ltd., is maintaining its interim dividend at 10 per cent., less tax.

Vactric, Ltd., has announced an interim dividend of 4 per cent., less tax (against 5 per cent.).

Stocks and Shares

TUESDAY EVENING.

THE issue of £80 million National Defence three per cent. stock, at 98, announced this week, puts an end to the suspense which has been current for some time past in regard to what might be the Government's intention as to fresh borrowing. The amount is regarded as being not unreasonably large; the terms have been favourably received. It seems likely that the new stock will meet with a satisfactory public reception, and it is not improbable that the price of the stock may be standing at a premium before very long. The money now being raised should be sufficient to satisfy the Treasury's requirements for the rest of the current year. The gilt-edged market will, therefore, be relieved for a time from the likelihood of further borrowing of this nature by the Government. The effect has been to depress those British Government stocks with which the new issue will come into competition.

Edmundsons' Bonus

Apparently the chief object of the one-in-two share bonus declared by Edmundsons Corporation is to bring the capital into more proper relationship with the assets, the latter having been swollen considerably through the consolidation of the group of undertakings controlled. No new money being involved, the transaction has no bearing on the Corporation's earning abilities. On the assumption that profits will be distributed on about the same scale as before, the general expectation is for a dividend of 6 per cent. on this year's bigger capital. The rate would give a yield of £4 16s. per cent. to the buyer of the shares at the present price, allowing for the value of the rights, worth about 13s. per share, which is still included. This latest issue raises the ordinary capital to £6,750,000; about seventeen times greater than it was twelve years ago. During the period, the amount earned for ordinary dividends has risen from £70,000 to £422,000.

"Rights"

That shareholders not infrequently neglect their own interests, in the event of new shares being offered to them on bonus terms, is underlined by the Clyde Valley Company's apparently having found it necessary to jog its proprietors' memories through the medium of a circular which drew atten-

tion to the right of shareholders to apply for one new share at par for every two old shares held. The present Clyde Valley shares are quoted at 35s. 6d. (cum-rights to the offer), and the new are changing hands at 14s. 9d. premium. It follows that an application would present the opportunity either of acquiring new shares at well below their market value, or, through renunciation of the shares allotted, of cashing rights that are well worth the having. That this is not so axiomatic as it will appear to many people, is evident from many other cases where shareholders have realised their opportunity only after it had become too late to rescue the application forms from the waste-paper basket.

Electrical Equipment and Manufacturing

From the past week's steadier behaviour of prices in industrial markets, it might be inferred that the shares are deemed to have fallen as far as is warranted by the general outlook and prospects. Sufficient buying has, in any case, been attracted to cancel out the ordinary trickle of selling. Crompton Parkinsons, with a spurt from 21s. 3d. to 25s., have been notable among electrical equipment shares. The feature may be said to have been provided by General Electrics. The shares at 72s. are up 3s. on the week, an additional 2½ per cent. bonus, making this 10 per cent., affording a pleasant surprise. Dividend and bonus together come to 20 per cent. for the year. The yield, at 72s. cum dividend, is nearly 5¾ per cent. on the money—a good return from shares of so sound an investment character. Renewed weakness is exhibited by some of the cable manufacturing issues. Both Enfields and Callenders have shed 1s. 3d. Ericssons, at 36s. 3d., have fallen half-a-crown; elsewhere, there are a few changes worthy of mention.

Debenture Stocks and Yields

The search for secure investments has caused something of a dearth of good industrial fixed-interest stocks, and has lowered the yield on those available. On first-class debenture stocks in the electricity supply market, yields are not greatly different from those on British Government issues. London Power 3¼ and 3½ per cent. debentures, for instance, are on offer to yield less than 3½ per cent., or, allowing for redemption, £3 11s. 6d. per cent. and £3 9s. 3d. per cent. respectively. The return on Electrical Distribution of Yorkshire 3¼ per cent. debenture, offered at 96 free of stamp, is £3 7s. 6d. per cent., or 2s. per cent. more to redemption in 1965. Rather better returns are offered by the 4 per cent. debentures of Isle of Thanet Electric, at 103 ex-dividend, and West Gloucestershire Power, at 105. No definite redemption date is fixed for the former, which pays £3 17s. 6d. per cent. on the money. The West Gloucestershire stock returns £3 17s. per cent., or 3s. per cent. less if redeemed in 1944. Of the few debentures offered in the electrical equipment market, English Electric 4 per cents can be bought at 103, to yield £3 18s. per cent. flat and £3 17s. 6d. per cent. to redemption in 1952. Allen West 4½ per cent. debentures are available at par.

Miscellaneous Matters

Cable and Wireless ordinary stock, at 47½, has added another point to the large amount of ground lost in past weeks. The preference is steady at 96, and the funded stock 5s. harder, at 100½. Home Railway stocks remain discouraged by the traffic returns. London Transport "C" stock has sagged to 74, but other traction issues are holding their own. A batch of excellent dividends and reports from steel and engineering companies helped the idea that prices of these shares are perhaps discounting as much in the way of a setback as the heavy industries are likely to see. A number of the shares made sharp recoveries. Babcock & Wilcox, at 38s. 9d., are 1s. 3d. up. Interest in rubber shares has picked up a little on hopes that the latest restriction on the output of the commodity will at least keep stocks within manageable proportions until American industry regains some of its normal equilibrium.

Transatlantic Affairs

American business and stock markets continue to act as a wet blanket on any disposition towards optimism in the London markets. Every now and then the inflationary possibilities of Mr. Roosevelt's huge spending and lending programme distract attention from the cheerless business news. But the resultant short bursts of market activity have expired, up to date, in listless fashion, having failed to shift the weight of present depression. Evidently there is little confidence in the ability of monetary artifice to provide the proper foundation for a lasting revival of activity. Prices of utility stocks are much as they were a week ago, although American Telegraphs, at 132½, are 2 points better. In South America, the investor's attention is occupied mainly with talk of amalgamation or nationalisation of the big Argentine railways. Official inauguration of the new Buenos Aires Transport Board failed to stir interest in Anglo-Argentine Tramway issues, or in other stocks concerned. Investment in Brazil found scant encouragement in this week's report by the Foreign Bondholders' Committee. Brazilian Traction shares remain only just in double figures, although a hopeful interpretation is placed on the recent declaration of a 50 cents dividend in respect of the current year.

There is a touch of irony in the fact of American prices going better, this Tuesday evening, on account of the U.S.A. Congress dissolving earlier than had been expected.

Share List of Electrical Companies

	Dividend. Nom.	Previous.	Last.	Price June 14.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	63/9	—	4 14 4
City of London	1	7½	7½	33/6	−6d.	4 9 7
Clyde Valley	1	7	8	35/6	—	4 10 2
County of London	1	10½	10½	48/6	−6d.	4 6 7
Edmundson's 7% Pref.	1	7	7	32/–	—	4 7 8
Do. Ord.	1	8	9	38/0	—	4 14 9
Elec. Dis. Yorkshire	1	9	9	42/6	—	4 4 9
Elec. Fin. and Securities	1	12½	12½	50/–	—	5 0 0
Elec. Supply Corporation	1	11	12	51/3	—	4 13 8
Lancs Light and Power	1	7½	7½	33/–	—	4 11 0
Lond. Assoc. Electric	1	—	7	30/–	—	4 13 4
London Electric	1	8	7	35/6	—	3 19 0
London Power Deb. Red.	Stock	5	5	105½	—	4 14 9
Metropolitan	1	10	12	50/–	—	4 16 0
Midland Counties	1	7½	8	36/6	—	4 7 8
Mid. Elec. Power	1	8	9	2	—	4 10 0
North Eastern Electric Ordinary	1	7	7	32/–	—	4 7 8
Do. 7% Pref.	1	7	7	32/–	+6d.	4 7 6
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	46/3	—	4 6 8
Do. do. 6% Pref.	1	6	6	29/6	+6d.	4 1 4
Scottish Power	1	8	8	36/–	—	4 9 0
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	17/6	—	8 11 6
Yorkshire Elec.	1	8	8	40/6	—	3 19 0
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	114	+1	4 7 9
Do. 1955–75	,,	5	5	114	—	4 7 9
Do. 1951–73	,,	4½	4½	108	—	4 3 4
Do. 1963–93	,,	—	3½	98	—	3 11 5
London Elec. Trans. Gtd.	,,	—	2½	93	—	2 13 9
London & Home Counties, 1955–75	,,	4½	4½	112	—	4 0 4
London Passenger Transport, A	,,	—	4½	116	—	3 17 7
Do. do. B	,,	—	5	116	—	4 5 10
Do. do. C	,,	4	4½	74	−1	5 14 10
West Midlands Joint Elec. 1948–68	,,	—	5	112	—	4 9 3
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	132¼	+2	6 16 0
Anglo-Am. Tel. Pref.	Stock	6	6	106½	—	5 12 7
Do. Def.	,,	1½	1½	25	—	6 0 0
Cable & Wireless 5½% Pref.	,,	4½	5½	96	—	5 14 7
Do. Ord.	,,	—	4	47½	−1	8 8 6
Do. Income	,	—	—	100½	+½	3 19 6
Globe Tel. & Tel. Ord.	10	5½*	7½*	15	+1½	5 0 0
Do. do. Pref.	10	6	6	13½	—	4 10 7
Great Northern Tel.	10	20	20	36	+½	5 11 1
Marconi-Marine	1	10	7½	25/–	—	6 0 0
Oriental Telephone Ord.	1	12*	12*	2½	—	4 7 8
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	6/3	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	13	—	—
British Electric Traction Def. Ord.	,,	5	5	925	—	—
Do. do. Pref. Ord.	,,	8	8	160	—	5 0 0
Brazil Traction	$100	70 cts.	$1	10	−½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	99	−½	5 1 0
Mexican Light Common	$100	Nil	Nil	1	—	—
Do. 1st Bonds	$500	5	5	25	—	—
Victoria Falls Ord.	1	20	12	64/6	+9d.	3 14 6
West Riding	1	6½	10	31/3	−⅛	—
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	1⅝	—	8 11 6
Assoc. Elec. Ord.	1	10	10	35/6	+6d.	5 12 8
Do. Pref.	1	8	8	36/6xd.	−1/–	4 7 6
Babcock & Wilcox	1	10	10	38/9	−⅛	5 3 1
British Aluminium Ord.	1	10	12½	47/6	−1/–	5 5 3
British Insulated Ord.	Stock	20	20	4½	—	4 16 6
Brush Ord.	,,	Nil	Nil	24½	—	—
Callender's	1	20	20	4⅞	−⅛	4 15 1
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/–	12½	12½	25/–	+3/9	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	10	12½	32/6	—	7 13 10
Enfield Cable Ord.	1	25	25	2⅜	−⅛	—
English Electric	1	Nil	10	26/–	−6d.	7 13 10
Do. do. Pref.	1	6½	6½	25/6	—	5 2 0
Ericsson Tel.	5/–	25	25	36/3	−½	3 8 9
Ever Ready	5/–	45	35	20/0	—	8 15 0
Ferranti Pref.	1	7	7	27/6	—	5 2 0
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	17½	20	72/–	+3/–	5 11 1
Henley's	5/–	15	20	20/–	—	5 0 0
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	10	12½	37/–	—	6 14 0
Lancashire Dynamo	1	20	25	55/–	−⅛	9 2 0
Siemens Ord.	1	7½	7½	23/9	—	6 6 4
Telegraph Construction	£1	7½	10	37/6	—	5 6 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1936

22309. "Automatic selectivity or tuning-control circuits." L. L. de Kramolin. August 13th, 1936. (485285.)

22582. "Electric supply systems supplying current to d.c. motors." English Electric Co., Ltd., C. E. Baston and E. A. Binney. August 17th, 1936. (485312.)

22723. "Diaphragms for sound-reproducing instruments." J. A. Briscoe, J. H. Nelson, Celestion, Ltd., and Murphy Radio, Ltd. August 18th, 1936. (485550.)

22814. "Cathode-ray picture-scanners." Telefunken Ges. für Drahtlose Telegraphie. August 19th, 1935. (485453.)

24274. "Electric fans." E. Bennett. September 6th, 1937. (485283.)

25045. "Electric circuit control systems." British Thomson-Houston Co., Ltd. September 14th, 1935. (485189.)

25356. "Electro-deposition of nickel-cobalt alloys." Bozel-Maletra Soc. Industrielle de Produits Chimiques. October 2nd, 1935. (485288.)

28448/9. "Recording or transmission of sound by electrical means." R. R. Glen. October 19th, 1936. (485557/8.)

28453. "Means for fastening tubes, electrical conductors, and the like to surfaces of various thicknesses." O. Dehne and X. Vorbruggen. October 19th, 1936. (Convention date not granted.) (485462.)

29691. "Electrical circuit-breakers." British Electrical & Allied Industries Research Association, W. B. Whitney and E. B. Wedmore. October 31st, 1936. (485463.)

31352. "Magnetically operated electric switches." A. Cianchi. November 16th, 1936. (485564.)

31576. "Electric lampholders." General Electric Co., Ltd., and G. S. Barrett. November 18th, 1936. (485376.)

31604. "Electric wave filters." E. C. Cork and J. L. Pawsey. November 18th, 1936. (485618.)

31642. "Dielectric liquids for use in electrical apparatus." Westinghouse Electric & Manufacturing Co. December 5th, 1935. (485619.)

31646. "Electron-multipliers." Farnsworth Television Inc. January 27th, 1936. (485620.)

31652. "Method and apparatus for television scanning." S. L. Clothier and H. C. Hogen-Camp. November 18th, 1935. (485622.)

31723. "Modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd., N. H. Clough and E. Green. November 19th, 1936. (485470.)

31774. "Thermionic valves." E. P. Rudkin. November 20th, 1936. (485626.)

31794. "Liquid-insulated a.c. electric circuit-breakers." A. Reyrolle & Co., Ltd., B. H. Leeson and R. H. Brierly. November 20th, 1936. (485579.)

31806. "Telephone or like systems." Standard Telephones & Cables, Ltd., E. P. G. Wright, E. A. H. Bowsher and F. H. Bray. November 20th, 1936. (485628.)

31807. "Equipment for recording particulars regarding telephone or like calls." Standard Telephones & Cables, Ltd. (L. Kozma). November 20th, 1936. (485580.)

31847. "Radio direction-finders." Marconi's Wireless Telegraph Co., Ltd. (Telefunken Ges. für Drahtlose Telegraphie). November 20th, 1936. (485583.)

31861. "Switching arrangements for telephone systems." Telefonaktiebolaget L. M. Ericsson. December 17th, 1935. (485585.)

31872. "Electrolytic production of sodium and other light metals." E. I. Du Pont de Nemours & Co. November 20th, 1935. (Addition to 433633.) (485587.)

31895. "Electric switch and like cover-plates." J. H. Tucker & Co., Ltd., C. Macbeth and R. G. Avison. November 21st, 1936. (485471).

31944. "Electric incandescent lamps." J. A. Cook and F. Taylor. November 21st, 1936. (485591.)

32064. "Electric welding." Marconi's Wireless Telegraph Co., Ltd. November 21st, 1935. (485596.)

32144. "Alarm apparatus for fluid-filled electric cable systems." British Thomson-Houston Co., Ltd. November 26th, 1935. (485389.)

32274. "Electric incandescent lamps." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). November 25th, 1936. (485476.)

32278. "Method of and means for generating synchronisation impulses in television transmission arrangements with Braun tubes." Radioakt-Ges. D. S. Loewe. November 25th, 1935. (Addition to 485119.) (485598.)

32596. "Systems for relaying and distributing radio programmes." R. E. H. Carpenter and P. P. Eckersley. November 27th, 1936. (Addition to 423673.) (485479.)

32705. "Electric lamps for illuminating instruments on motor cycles, motor cars and other vehicles." A. G. Westmoreland. November 30th, 1936. (485207.)

34294. "Air-spaced-insulated high-frequency electric cables." Siemens & Halske Akt. Ges. December 13th, 1935. (Cognate application 34295/36.) (485400.)

34692. "Cooling systems for vapour-electric convertors." General Electric Co., Ltd., E. Gallizia, M. W. Woods, Ltd., and R. H. Holbeche. December 17th, 1936. (485402.)

34718. "Electron-discharge device arrangements." Telefunken Ges. für Drahtlose Telegraphie. December 17th, 1935. (485298.)

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639. "Manufacturing carriers for the mechanical recording of oscillations." Naamlooze Vennootschap Philips Gloeilampenfabrieken. January 11th, 1936. (485303.)

855. "High-pressure mercury-vapour electric-discharge lamps." General Electric Co., Ltd., V. J. Francis and J. W. Ryde. January 11th, 1937. (485489.)

3356. "Electrical systems of remote control." General Electric Co., Ltd., and A. R. Kahl. February 4th, 1937. (485308.)

3431. "Television receivers." E. K. Cole, Ltd., and A. R. Knipe. February 5th, 1937. (485309.)

3492. "Phase-changing arrangements." British Thomson-Houston Co., Ltd., A. H. Maggs and S.-U. A. Choudhury. February 5th, 1937. (Addition to 441062.) (485495.)

4515. "Electrodes and other articles made from nickel or nickel alloy." Naamlooze Vennootschap Philips Gloeilampenfabrieken. February 17th, 1936. (485220.)

5592. "Electrical measuring instruments and relays." N. Ryder, S. J. Eidsforth and Metropolitan-Vickers Electrical Co., Ltd. February 24th, 1937. (485222.)

6002. "Electric motors." H. Moser and E. Schneebeli. February 29th, 1936. (485225.)

6506. "Air-insulated electric cables." Siemens & Halske Akt. Ges. March 5th, 1936. (485408.)

6899. "Electrical indicating or measuring instruments." T. W. Corbin. March 9th, 1937. (485317.)

7817. "Cathodes for electric-discharge devices." General Electric Co., Ltd., and J. T. Randall. March 17th, 1937. (485410.)

8192. "Television receivers." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. May 23rd, 1936. (485412.)

10760. "Cathode glow lamps." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). April 15th, 1937. (485325.)

11124. "Printing-telegraph exchange systems." Siemens and Halske Akt.-Ges. April 20th, 1936. (Addition to 471406.) (485327.)

11404. "Electric-discharge lamps." British Thomson-Houston Co., Ltd. April 22nd, 1936. (485329.)

12658. "Electric hot-plates and the like." British National Electrics, Ltd., S. F. Bickell and W. A. Gillott. May 4th, 1937. (485603.)

15056. "Portable electric fire igniters." W. Schottky. May 31st, 1937. (Addition to 384,387.) (485340.)

16013. "Electric control systems employing resonance relays." British Thomson-Houston Co., Ltd. June 12th, 1936. (485419.)

16270. "Wiper switches for use, for instance, in telephone systems." Mix Genest Akt.-Ges. June 19th, 1936. (485420.)

16272. "Switches of the type used in automatic telephone systems." Mix Genest Akt.-Ges. June 19th, 1936. (485421.)

16700. "Apparatus for registering telephone calls." C. V. A. Ljungqvist. June 16th, 1937. (485248.)

18680. "Mercury-vapour electric-discharge devices." British Thomson-Houston Co., Ltd., General Electric Co., Ltd., and E. Germer. July 9th, 1936. (485515.)

18935. "Coin chutes or holders for automatic coin-operated prepayment machines for electricity." Siemens-Schuckertwerke Akt.-Ges. July 10th, 1936. (485346.)

20325. "Transmission for the driving axles of vehicles driven by electric motors." Ateliers de Constructions Electriques de Charleroi. July 28th, 1936. (Cognate application 20326/37.) (485426.)

20632. "Electric-discharge devices utilising electron multiplication. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 28th, 1936. (485427.)

20645. "Electron-discharge tube amplifiers." Marconi's Wireless Telegraph Co., Ltd. July 25th, 1936. (485428.)

20909. "Polyphase rectifying systems, comprising single anode valves." Allmanna Svenska Elektriska Aktiebolaget and U. Lamm. July 28th, 1937. (485349.)

21412. "Indicator devices or directories for all uses, and particularly for telephone call numbers." J. Leclere. November 10th, 1936. (485434.)

21712. "Producing metal sheets especially used for television scanning-discs." Radioakt.-Ges. D. S. Loewe. August 7th, 1936. (Cognate application 21713/37.) (485437.)

22318. "Thermionic oscillation generators." A. Helbig. August 13th, 1937. (485438.)

22689. "Electric-discharge devices." British Thomson-Houston Co., Ltd. August 19th, 1936. (485352.)

23424. "Radio relay systems." Marconi's Wireless Telegraph Co., Ltd. September 25th, 1936. (485353.)

23722. "Electric-discharge tubes." Naamlooze Vennootschap Philip's Gloeilampenfabrieken. September 1st, 1936. (485439.)

23733. "Electric switches employing mercury or other conducting liquid." A. Cianchi. August 31st, 1937. (485259.)

24526. "Electromagnetic relays." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 11th, 1936. (485445.)

25732. "Electron-microscopy and apparatus therefore." Zeiss Ikon Akt.-Ges. October 2nd, 1936. (485264.)

26494. "Electric time switch." E. Zbinden. October 5th, 1936. (485521.)

27264. "Electric condensers." F. C. Stephan and Telegraph Condenser Co., Ltd. October 7th, 1937. (485526.)

27402/3. "Light-sensitive devices." British Thomson-Houston Co., Ltd. May 29th, 1937. (485529/30.)

27554. "Making, breaking, and regulating electric circuits by variations of speed." A. P. Pearce. October 11th, 1937. (485268.)

27969. "Electric motors." M. Surjaninoff and M. Surjaninoff. October 14th, 1936. (485270.)

28207. "Electric arc lamps." British Thomson-Houston Co., Ltd. October 17th, 1936. (485359.)

28684. "Immersion electric-heater elements." J. W. A. Pearce. October 21st, 1937. (485273.)

28743. "Arrangements for obtaining a direct-current voltage from an alternating current supply." C. Lorenz Akt.-Ges. October 21st, 1936. (485360.)

29642. "Receiving arrangements for wired-radio systems." C. Lorenz Akt.-Ges. November 6th, 1936. (485362.)

30154. "Thermo-electric safety devices for gas apparatus." Askani-Werke Akt.-Ges Vorm Centralwerkstatt Dessau und C. Bamberg-Friedenau. January 9th, 1937. (485539.)

30615. "High-pressure mercury-vapour discharge lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 10th, 1936. (485274.)

31519. "Lighting fittings." British Thomson-Houston Co., Ltd. November 16th, 1936. (485366.)

35354. "Cathodes for cathode-ray tubes." V. Zeitline, A. Zeitline and V. Kliatchko. December 22nd, 1936. (485548.)

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939. "Coupling systems for use in radio or like receivers." Hazeltine Corpn. January 21st, 1937. (485613.)

10095. "Telephone or like systems." Standard Telephones and Cables, Ltd., E. P. G. Wright, E. A. H. Bowsher and F. H. Bray. November 20th, 1936. (Divided out of 485628.) (485635.)

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare.—Houses (106), Llwydcoed; U.D.C. surveyor.
Aldridge.—Houses, Pilsall and Paddock Lane; U.D.C. surveyor.
Aspull.—Houses (70), Crawford estate; U.D.C. surveyor.
Barking.—Houses (276), Scratton's Farm estate; C. C. Shaw, borough architect.
Barnet.—Houses (110), Grange estate, Mays Lane; surveyor. Cinema, East Barnet Road, for Dominion (Barnet), Ltd., 37-38, Golden Square, London, W.1.
Barnsley.—Houses (130), Park House estate; borough engineer.
Beaconsfield.—Houses (26), Fernhurst site, for U.D.C.; Burgess, Holden & Watson, architects.
Biddulph.—Factory, Congleton Road, for North Staffordshire Fire Clay Co., Ltd.
Birmingham.—School clinic, Maas Road, Northfield (£6,900); city surveyor.
Blyth (NORTHUMBERLAND).—Houses (300); L. Leeper, borough engineer.
Bristol.—Houses (150), Manor House estate, Fishponds; John Bryant Estates, Ltd., Winterbourne, Bristol. Two schools, Filwood Park; C. H. White, architect.
Bromsgrove.—Houses (222), Orchard estate; U.D.C. surveyor.
Bucknall (STAFFORDSHIRE).—Houses (106), Eaves Lane estate; H. Clownes.
Burton-on-Trent.—Houses (127), Rosliston Road site; borough surveyor.
Bury.—Town Hall (£150,000); Jackson and Edmonds, architects, 24, Bennett's Hill, Birmingham.
Canterbury.—Houses (48), Reed Avenue, for T.C.; H. W. Collingwood, builder, Barham.
Cardiff.—Houses (38), Highmead estate (£12,915); R. B. Fear. Public hall, exhibition and concert hall, Wood Street (£400,000); S. Clough, architect, 625, Cecil Chambers, Strand, London, W.C.2.
Chepping Wycombe.—School, Desbrough Castle; J. A. Parkinson, borough surveyor.
Chesterfield.—Houses, Shirland and Pilsley (210), for the R.D.C.; J. B. Wikeley, engineer and surveyor.
Coleshill.—Houses (58), Station Road and Ennerdale Close; A. Walker & Son, builders.
Colindale.—Extensions to factory, The Hyde (£30,000), for Spurling Motor Bodies, Ltd.; D. G. March, architect, 88, Chancery Lane, W.C.2.
Crewe.—Houses (102), Timbrell Avenue; borough surveyor. Aero-engine factory, for Rolls-Royce, Ltd., Derby.
Darlington.—Cinema, for Thompsons Enterprises, Ltd.; J. H. Morton and Son, architects, Fowler Street.
Derby.—Municipal offices (£134,244); borough engineer.
Dewsbury.—Houses (150), Canterbury Road site, for the T.C.; Harlow & Milner, Ltd., bricklayer.
Doncaster.—Factory, Wheatley Park estate, for International Harvester Co. of Great Britain, Ltd., 259, City Road, London, E.C.1.
Douglas (I.O.M.).—Ice-cream factory, Chester Street; J. Felice.
Dundee.—College of Art, Belmont, Perth Road (£87,397); J. Wallace, architect, Charlford, Highfield, Llandaff, Glamorgan.
Flintshire.—Schools, Holywell and Pestatyn, for the E.C.; R. G. Whitley, County Offices, Mold.
Gateshead.—Houses, Easton Street and Leonards Court, for T.C.; borough engineer.
Glamorganshire.—School, Pontypridd (£32,874); for the County E.C.
Glasgow.—Houses (1,728), Penilee; housing director.
Grantham.—Factory, Springfield Road, for the British Manufacturing and Research Co.
Halifax.—Houses, Nursery Lane and Weather House estates (500); borough engineer.
Hertfordshire.—School, Baldock (£31,325), for the County E.C.
High Wycombe.—Booker isolation hospital extension (£19,790), for Wycombe and District Joint Hospital Board; W. A. James & Sons, builders, Maidenhead.
Lanarkshire.—Houses (512), for the County Council; county architect, Hamilton.
Lancashire.—Extensions to grammar school, Poulton-le-Fylde, for the E.C.; T. Croft & Sons, Ltd., contractors, Preston.
Lancaster.—Houses (24), near St. Nicholas Lane, for W. Bargh, Bolton-le-Sands.
Lichfield.—Houses (70), Ponesfield estate; city engineer.
London (FULHAM).—Four-storey block of dwellings, Carnwath Road; borough surveyor. (WESTMINSTER).—Extensions to terminal garage, Elizabeth Street (£40,000), for London Coastal Coaches, Ltd.; Wallis, Gilbert & Partners, architects, Coastal Chambers, Buckingham Palace Road, S.W.1.
Meriden.—Houses (24), Bentley Road, Castle Bromwich; J. A. Heywood. Houses (58), Station Road and Ennerdale Close, Coleshill; A. Walker & Son, Ltd., High Street, Coleshill.
Mountain Ash.—Houses (25), Ynysybwl; architect, Town Hall.
Newcastle (STAFFS).—Houses (124), Brampton Tree House estate; Bramfield Hall Estates, Ltd.
Newcastle-on-Tyne.—Business premises, Stamfordham Road, for the Co-operative Society; C.W.S. Building Department, West Blandford Street.
Northallerton (YORKSHIRE).—Houses (22); R. P. Brotton & Son, architects, Chop Gate, Middlesbrough.
Northwich.—Cinema (£30,000), London Road, for R. Walker, manager, Plaza Cinema.
Nottingham.—Houses (426), Aspley Lane estate; E. Phillips, housing architect, Exchange Buildings East.
Oldbury.—Houses (350), Causeway Green estate; borough surveyor.
Oldham.—Four-storey extension at the Municipal Hospital (£60,000), Boundary Park, Oldham, for the Corporation; Thomas Partington & Sons, contractors, Bentley Street, Chadderton.
Purley.—Extensions to Purley and District War Memorial Hospital, Brighton Road (£45,000); H. Berney & Son, architects, 33, High Street, Croydon.
Rothwell (YORKS).—Houses (42), Willans Avenue; W. W. Schofield & Sons, 54, Joseph Street, Hunslet.
Runcorn.—Cinema, Greenway Street, for Cheshire County Cinemas, Ltd.; W. & S. Owen, architects, Palmyra Square Chambers, Warrington.
Scarborough.—Maternity and child welfare centre; borough engineer.
Shardlow (DERBY).—Extensions to Draycott isolation hospital (£16,650), for Joint Hospital Committee; N. Antliff, architect.
Sheffield.—Houses (92), Binstead Road, Binstead Drive and Standon Road; A. Clayton, builder, Avisford Road. Houses (26) and garages, High Storrs Drive and High Storrs Road; A. Shaw, 181, High Storrs Road. Flats (78), Fulwood Road; A. Krausz, 9, Wilkinson Street. Maternity and child welfare clinic and relief station (£17,357), for the City Health Committee; D. O'Neill & Son, contractors, Solly Street.
Shifnal.—Houses (26), for the R.D.C.; Jenkins & Byram, architects. Central Chambers, Market Square, Wellington, Shropshire.
Southampton.—Factory for Supermarine Aviation (Vickers), Ltd.; Sutcliffe, Farmer & Taylor, architects.
South Shields.—Offices for Vasey & Reed; Summerbell and Son, contractors, Rutland Street.
Stalybridge.—Development of Heyrod estate; A. Wych, architect.
Stocksbridge (SHEFFIELD).—Houses (180), Spink Hall scheme; D. E. Robinson, U.D.C. surveyor.
Stourport.—Houses (106), Manor Farm estate, for T.C.; Arthur Griffiths, Ltd., contractors, Wolverhampton.
Stretford.—Clinic, Mitford Street (£6,078); E. Marshall & Sons, Ltd.
Sunderland.—Houses (18), Broomshields Avenue; J. W. Ridley, builder, Park Lane. Houses (14), Burnhope Drive; C. E. Seymour & Co., builders, Sunderland. Houses (26), Dene Lane; H. T. D. Hedley, architect, 49, Frederick Street. Houses (20), Millview Avenue; G. T. Brown & Sons, architects, 51, Fawcett Street.
Thrapston.—Houses (50), Ringstead; Loakes & Pettit, Thrapston.
Torquay.—Houses (30), Coombe Lane; Mrs. E. Jerram. Houses (188), Watcombe estate; Butler Bros. (Birmingham), Ltd.; Clinic, Tor Hill Road; borough engineer.
Tottenham.—Houses (42), Scotland Green estate; borough engineer.
Wallsend-on-Tyne.—Flats, East Farm estate; J. H. James, builder, High Street East.
Walsall.—Houses (88), Green Rock estate; Dickinson & Holford, Ltd. Houses (32), Ryecroft estate; H. W. Casey. Factory, Brockhurst Crescent; Smith, Bayliss & Nettlefold, Ltd.
Warrington.—Houses (99); R.D.C. surveyor.
Weymouth.—Hospital, Radipole Lane for Weymouth and Portland Joint Hospital Board.
Widnes.—Houses (60), Hale Bank estate; borough engineer.
Willesden.—Four factories and extension for Nukarloid Co., Ltd., 906, Harrow Road, N.W.10.
Willington Quay.—School (£23,766); E. Thompson contractor, 12, Grey Street, Newcastle-on-Tyne. Extensions to the works of R. Hood Haggie & Son, Ltd.; Alnwick Engineering Co., Ltd., contractors, Alnwick, Northumberland.
Wolverhampton.—Houses (26), Bhylls Farm estate; Silcostyle Estates, Ltd. Houses (28), Pendeford Avenue; P. Gallagher. Extensions to factory; Boulton Paul Aircraft, Ltd.
York.—Houses (74) and flats, Gale Lane estate (£33,000); Sheriff and Co.
Yorkshire.—School, Benton Park estate, Harrogate, for the West Riding E.C.; county education architect, Wakefield.

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from June 8th:—

Power Atom. No. 584785. Class 6. Portable electrically and pneumatically operated drilling and screwing machines.—Desoutter Bros., Ltd., 73, Baker Street, W.1.

Invicta (lettering and design). No. 584261. Class 8. Philosophical and scientific instruments and apparatus for useful purposes, &c.—Invicta Radio, Ltd., Radio Works, Parkhurst Road, N.7.

Pam. No. 584737. Class 8. Instruments and apparatus for use in wireless telephony and telegraphy.—Pamphonic Reproducers, Ltd., 45, King's Road, Camden Town, N.W.1.

Piloray. No. 583865. Class 11. Therapeutic lamps (not medicated) for surgical or curative purposes or in relation to the health of man.—Pilot Radio, Ltd., 87, Park Royal Road, N.W.11.

Sano Aire (lettering and design). No. 584262. Class 11. Apparatus for the production of ultra-violet rays for surgical or curative purposes.—Hanovia, Ltd., Bath Road, Cippenham, Slough, Bucks.

Frevic. No. 583665. Class 13. Electric bedwarmers, consisting principally of heating elements of ordinary metal.—A. Stephenson, 5, Shepherd Hill, Harold Wood, Essex.

Leclad. No. 584701. Class 13. Electric wires having an outer covering of lead.—Liverpool Electric Cable Co., Ltd., 7, Fortune Street, Golden Lane, E.C.1.